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THE

PRACTICAL TEACHER

A MONTHLY MAGAZINE AND REVIEW

FOR THE SCHOOL-ROOM AND THE STUDY

VOL. XVIII. No. 12. JUNE, 1898. PRICE, 6D. POST FREE, 8D.

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THE SCHOOL JOURNEY—A MEANS OF TEACHING GEOGRAPHY.

I.

BY J. H. COWHAM,

Professor of Education, Westminster Training College, S.W.

INTRODUCTORY.—The value of the 'School Journey' for purposes of teaching geography is not a present-day discovery. Pestalozzi taught geography by means of rambles through Swiss valleys; Joseph Lancaster accompanied his scholars on their country walks to Clapham, Wandsworth, and Wimbledon. In a paper read before the Health and Education Congress at South Kensington in 1884, the writer of this article described an experiment that had been made for several years at the Westminster Training College. Since then the 'School Journey' has been repeated each year. A very interesting account of the 'School Journey' in Germany is given by Miss Dodd, Day Training College, Manchester, in the 'Special Reports on Educational Subjects,' issued by the Education Department. It remains to be stated in this introductory paragraph that teachers who have been conducted over the district about to be described have afterwards taken groups of their own scholars over the same district, and with good results. It is proposed, in this first paper, to give an account of the preparation of the pupils by class work before starting upon the excursion. In a second paper the actual journey will be described, and an attempt will be made, by the aid of diagrams and other illustrations, to show how first-hand knowledge gained in the field may be made of service in all succeeding lessons in geography.

PREPARATION FOR THE 'SCHOOL JOURNEY.'—If the full value, so far as educational effects are concerned, is to be obtained from the journey, it must be preceded by very thorough preparation. To tell the pupils that they are about to be taken for a ramble in the country may arouse an agreeable state of mental expectancy; but this alone will not be the condition of mind necessary for understanding the geographical features of the district traversed. It is not so much the sight of surface forms—hill, valley, stream, etc.—but rather, the effort to connect these forms with the natural forces which have brought them about that is of value. A valley with its winding course, its woody slopes, and fertile fields, is a very attractive feature. The town scholar will be delighted with the prospect, and the view may live for many months as a precious possession in his memory. A possession of much higher value, however, for geographical study, is the ability to associate the various features of the valley with the agencies which have produced them. The valley is an effect; it has a history. Can that history be made known? If so, by what means? How far can the scholar be led to unravel this history by an exercise of his own thought? In answer to these important questions, it may be said that looking at the valley or walking along it will accomplish very little. The mind of the pupil must be prepared. He must bring with him a good stock of knowledge gained in the class-room by the study of maps, sections, and plans. The nature of this preparatory exercise must now be explained. In order to make the explanation full and definite, it is proposed to state exactly the line of preparatory enquiry adopted in a class which has frequently profited by the 'Journey.'

> Many readers of the PRACTICAL TEACHER will understand at the outset that the following plan of procedure can only be illustrative of the *method* of preparing for, and of conducting, a 'School Journey.' The *matter* dealt with must vary with every district. The method of study will, however, be the same whatever the district selected.

PLAN AND MAP OF THE DISTRICT.—These are taken from the maps published by the Ordnance Survey. The Plan is shaded to show the succession of rocks—clay, sand, gravel, chalk, etc.—covering different portions of the area. The surface appearances due to the presence of these underlying rocks is indicated on the Map. For example, the district on the above map immediately in the Thames Valley, and stretching a mile southward from the river, is a low-lying flat covered

with a rich deposit of alluvial mud. Upon this flat area some of the most productive market produce used to be grown. The rich alluvial soil should be connected with the river Thames, which, during past floodings and very high tides, overflowed its banks and left a deposit of fine mud upon the flooded area. The alluvial area just described is followed by the clay district. This reaches from New Cross to Croydon. The clay tends to weather quite flat. To impress this, reference may be made to the efforts made by the railway companies round London to keep the clay from filling their cuttings. Trenches are dug, and afterwards filled with a binding material such as chalk. The class is told to watch for sliding clay and chalk trenches when passing by rail over this part of their journey.

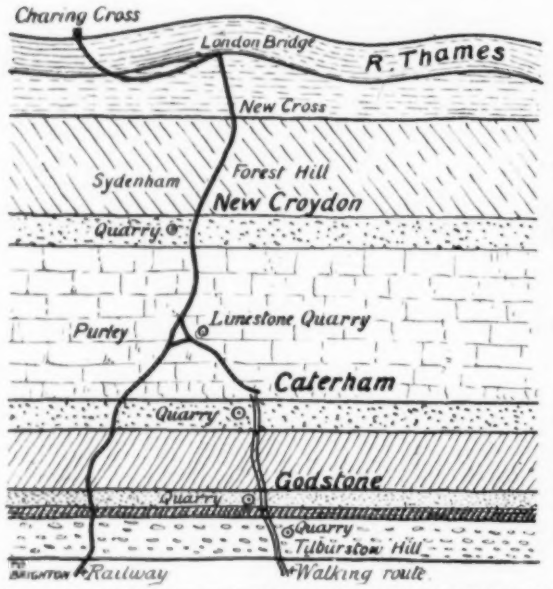


FIG. 1.—Plan of School Journey from London Bridge to Tilburstow Hill, showing also the different formations crossed.

References: ——— = Railway; ≋≋≋ = Walking Route; ⊙ = Quarry.

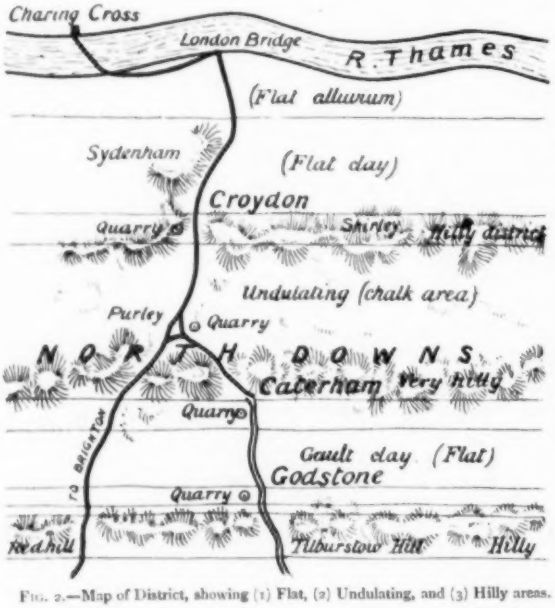


FIG. 2.—Map of District, showing (1) Flat, (2) Undulating, and (3) Hilly areas.

They will then associate the level character of the surrounding country with the presence of the clay. Most districts in England present instances of this tendency to flat weathering on the part of clay. Reference may be made to certain growths highly characteristic of a clay surface. Rushes and the plant commonly called 'coltsfoot' may be shown. Beyond Croydon the clay gives place to the sands and gravels called the *Lower London Tertiaries*. The scenery at once changes. Instead of the level plain are the beautifully picturesque hills of Shirley, Addington, and Hayes Common. Many scholars in South London have visited one or other of these hills during their summer outings. A pupil might be asked to describe the chief features of the district. These are well-wooded hill tops, steep sandy or gravelly slopes, and mounds covered with either heather or the tangling blackberry bush. Half-a-mile further south the surface again changes. The long and monotonous curves of the chalk Downs, with their scanty soil and short herbage, form a most striking contrast from the steep and well-wooded hills just passed.

> London scholars are frequently taken for excursions to Epsom Downs. Others visit Margate or Brighton during the summer months. The monotonous character of the surface aspects of these districts is well known. Recall them, and lead the class to expect similar appearances in the district to be visited. Similar areas are found throughout England to the east and south of a line joining Flamborough Head with Portland. The Pennine district in the north yields similar though somewhat less monotonous outlines. Salisbury Plain is a good example of long monotonous chalk undulations in the south.

SECTIONS AND PLANS.—From the village of Caterham a more detailed account of the district is proposed. This portion of the journey is taken on foot. In order to prepare for a thorough understanding of the geographical aspects of the surrounding country, it becomes necessary to study carefully the accompanying sections and plans. Section I., Fig. 3, exhibits in general outline the arrangement of strata beneath London. It will at once be evident to the most casual observer that the rocks are all arranged in *basin* form. It is also clear that in passing from London Bridge to Caterham, the exposed edges of the London clay, the sands and gravels (Lower London Tertiaries), and the chalk appear in succession. If, now, the section be followed beyond Caterham, it will be seen that a series of new rocks come to the surface in quick succession. A journey of about two miles enables the pedestrian to cross the exposed edges of not less than four very distinctly different kinds of rock. There is immediately after the chalk a small area of gritty rock called the *greensand*. This is followed by a very dark, close-textured clay called the *gault*. The gault clay repeats all the surface appearances of the London clay above described. A fine silver sand is next visited, and the country immediately becomes undulating. Lastly, the rocks change to a hard building stone and an iron-banded sand called the Hythe beds. The iron bands resist decay and weathering, and the country rapidly rises in height until Tilburstow Hill is reached, at a height of about 600 feet.

> 'During the "journey," no effort must be spared to connect the constantly changing aspects of the country with the frequent change in the rocks of the district. It is in this association of change of rock with change of scenery that the value of the exercise chiefly rests. Furthermore, if the scholar can securely fix these associations in the one district visited, he will afterwards be able to carry out similar modes of investigation and association in any other area he may visit.'

When the summit of Tilburstow Hill is reached the visitor will not have much difficulty in understanding the next thirty miles of view, viz., that over the Weald as far as the

BRITISH MUSEUM

South Downs. If the series of rocks on the extreme right of the section be examined by the scholars, they will at once see that the rocks mentioned are not new. A little time for examination of the series, and it becomes apparent that the rocks are those just passed under review, the only difference is in the arrangement of the rocks. They are arranged in reverse order. Attention may be drawn to the dotted lines connecting the series of strata on the north with those on the south. It will not require the eye of a trained observer to see that the rocks on the south (the South Downs, etc.) must at one time have been connected with those in the north. A question at once arises, viz., What has become of the rocks represented by the dotted lines? Allow the scholars a little time to suggest the agencies that have done all this work. Now, it will be well to try the imaginative powers of the class. See if any pupil, after replacing the rock matter that has been carried away, can state how many chalk ranges originally covered this part of England. If, instead of the two detached chalk ranges at present existent, the scholars can see evidence of only *one chalk range* in the past, then the teacher may go on to the next point of interest. This range of hills would give rise to the rivers which flow northwards into the Thames, viz., the Wey, Mole, Darent, and Medway. How these rivers (flowing northwards from their sources in the higher portions of the great chalk range) have cut down their channels, and thus have found their way into the Thames, must be left for full explanation in a following paper.

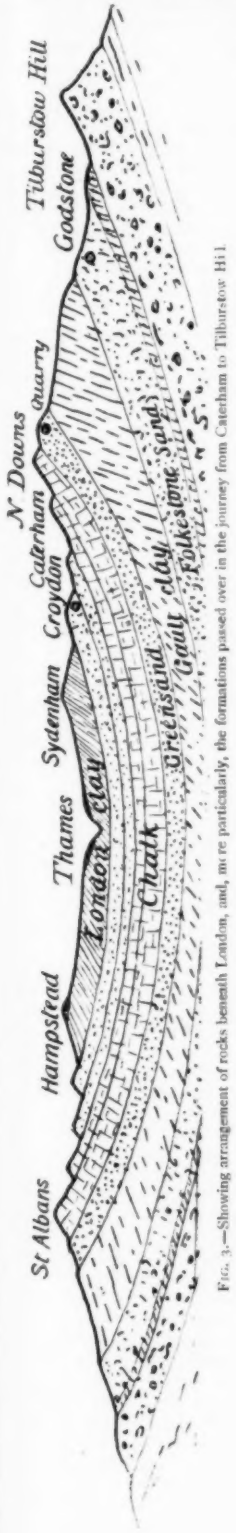


Fig. 3.—Showing arrangement of rocks beneath London, and, more particularly, the formations passed over in the journey from Caterham to Tilburstow Hill

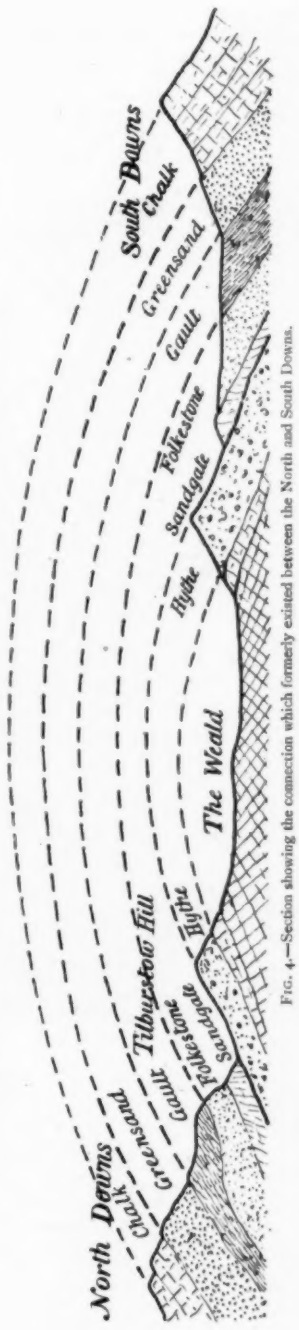


Fig. 4.—Section showing the connection which formerly existed between the North and South Downs.

RECREATIVE TRAVEL PAPERS BY PRACTICAL TEACHERS.

V.—SPAIN (continued).

AND now we were to see Toledo, a city so ancient that legend dates it back to the Creation, and so famous, first as the Toletum of the Romans, then the great city of the Goth, and later the capital of the kingdom, that few other towns can compare with it. In the case of many other historic spots, death and burial have been life, and their resurrection has taken a modern age straight away to the life of a far-off past; but here is a spot which not having known death, is most fully alive, and this great vitality, despite continuity, makes Toledo exceptionally fascinating. The railway by which it is reached takes you to a station in the suburbs some way beyond the city, but the 'bus drive along the main road, especially if enjoyed from a top seat, is full of interest. The meadows in which the Cid's sons-in-law were punished for their ill-behaviour to their wives are on the right, and there before us, perched on a rock, springing as it were from the Tagus, 1,860 feet above the sea, rises the imperial city, with its great fortress, the Alcazar, its many towers, and brown walls unrelieved by vegetation, grand and solitary. And soon the 'bus is crossing the Alcantara bridge, below which the deep river is running full in its rocky bed, washing a strand on either side, as sandy and shingly as many a sea beach; and now we are passing Cervantes' castle, and soon the very house in which the immortal author of 'Don Quixote' spent his early days is so near us we can peep into its open door. After that one scarcely feels quite so foreign, for the author, known and loved in one's own land as much as in his, is a connecting link between the two. There is something in real genius so far above the petty things which often separate human beings, that fraternity seems invisibly written on the very ruins of any place that once knew it in the flesh.

Not far off rises the ruins of King Wamba's palace, looking somewhat familiar, because it is so often the subject of picturesque prints; here it was that happened that incident of Roderick and Count Julian's daughter, which is said to have led up to the incoming of the Goth. And down there in the valley is all that remains of the Palace of Galiana, where Charlemagne slew his rival Bradamant, and presenting the head to the *châtelaine* was rewarded with her hand. *Cherchez la femme*, again, says some masculine reader here. Quite true, good sir! but as there are but two sexes on this little round earth of ours to work out all the mischief with which it teems, you are likely to find the one you look for. After all, there is something to be said for the necessity of *seeking*.

But let us leave our castles in Spain, and take note of the old Zocodover we are now entering; it is a Moorish square, and has been the mirror of Toledan life for centuries upon centuries. And all that time it has re-echoed to the purest Castilian speech. Did not Alfonso X. fix the language spoken here as the standard of sound and sense for the rest of the country? and to-day, we are told, the best speech in Toledo is not far behind that which obtained this high hall-mark. At last we alight at our hotel, the 'Fonda de Lino,' quite a native one, but all the better for that; one wishes to be as un-English as possible for a time, and, while we are taking stock of our new surroundings, in walks an old dark-eyed guide, Pedro by name, who makes his bow with all the gravity and suavity of his race, and tells us at once, as evidence of his respectability, that in his youth he dwelt for a time at King's Cross. But this scarcely catches on, most of the party believing that among the thousands of rare birds that visit the metropolis a Spaniard or two must now and again alight at King's Cross without adding to their repute thereby. He then proceeded to business, by saying he was the 'von best guide in the town.' Well, that took, and a section of the party, who had more faith in Toledans than the rest, put themselves under Peter's wings, poor things! and made off with him to the Cathedral. And then their troubles began, for Pedro soon proved a burden too grievous to be borne, and so with the same grace with which they are accustomed at home to bribe the organ-grinder off into the next street, they dismissed their guide. He looked astounded to find a party of strangers could dispense with the services of the 'von best guide,' and seemed to be breathing as well as looking unuttered things. Poor old man! how could he know that many of these travelling teachers are living volumes of art and history revised to date, and know more of his Cathedral than he does himself? Then we began the building in earnest, and found it truly wonderful, with its fine naves, and their eighty-eight columns, all lighted dimly by thirteenth century glass of purest colour; its gilt retablo rising to the ceiling; its altar flanked by many chapels, in which lie great Spanish worthies and unworthies, whose lives were lived in days more deeply marked than these. A little tabernacle represents that visit of the Virgin to San Ildefonso to reward him for writing a treatise in her honour; to this tale Toledo owes the distinction of being the primacy of Spain. In the shrine is a little image of the Virgin, which at that visit she declared to be 'exactly like her,' and embracing it tenderly, gave to it miracle-working power. But in his 'Wanderings in Spain,' Mr. Augustus Hare says the more important idol here resides in the sacristry, and is the most hideous of all the black dolls for which St. Luke is held responsible. She possesses a wardrobe and a collection of jewels of unparalleled richness. As in other Roman Catholic countries, the Madonna's dress is changed at festival times, when she is the object of great admiration among the poorer people. One wonders whether this custom has led to the general habit of changing costume at Easter among the working classes of Europe, or whether the latter led to the former. The Virgin is in especial evidence at Easter-time. In the Sacristia Mayor is a series of authentic portraits of great ecclesiastics, among them one of Carraza, who died in a dungeon after an eleven years' imprisonment, because, as the Confessor of Charles V., he had urged the dying monarch to faith in Christ as the only Saviour, which was held to savour of Lutheranism; and another of the Cardinal Ximenes, to whom is due the Mosarabic chapel, which is the domed part of the building shown in our photograph. It is near the western door, and has a remarkable history. Long ago, when the Moors came in, the Toledans obtained from them permission to retain five Christian churches in which to worship according to their faith, and for four hundred years they were known as Mos-Arabs (mixed with the Arabs). But another day dawned, and the reign of Alonzo VI. found Christianity ascendant again. At this time the Gregorian ritual was superseding the Roman, and a papal legate urged the king to enforce it upon his Toledan subjects; but revolution was about to follow the attempt, and the king agreed to trial by combat. On the Vega, down by the river side, near the very ancient Puerta del Sol, or Gate of the Sun, the champions met, and the victory was with the Mos-Arabs; then, the royalties discomfited, began to feel pious scruples as to the mode of combat, and proposed another by fire. Thereupon a great bonfire was lighted in the Zocodover, and before excited crowds the two rituals were thrown on the flames; the Roman was at once blown out by the wind, and the Mosarabic remained unscathed in the flames. The joy was unbounded at this result among the populace, and there was no further let or hindrance with regard to their religious observances. But in course of time the thing for which such strong party feeling had been shown, of itself fell into desuetude, and would have died a natural death had not the energetic Ximenes built this chapel and endowed it with an order of priests to maintain the ancient form of service. This was midway in the sixteenth century, and to-day you may hear the old order carried out in this chapel; on its walls are battle scenes in fresco, chief among them 'The taking of Oxen from the Infidels.' There is much more to tell of this great Gothic Cathedral, but the town must be seen, and leaving by the western door, and walking round the cathedral, one is filled with regret that such a *chef-d'œuvre* should lie so low, and be so closely surrounded by houses in the narrowest of streets. In the chief street two carriages cannot pass each other, and a notice to warn off others has to be fixed at the upper end when one is passing through. Many of the houses

TOLEDO CATHEDRAL, WITH MOSARABIC CHAPEL.

are Moorish, and the distinctive horseshoe arch meets the eye everywhere. And Christian art has often fastened itself on Moresque remains, as in the church of Christo de la Luz, which stands near the Puerta del Sol, and was so standing when Alonzo VI. entered the gate in 1083. The arches are thick and heavy, and of horseshoe shape, and the ornaments are traceable to those lands through which the Arabs had wandered. The curious name of this church is due to the following story :—

One day the Cid, riding by to battle, was stayed here by his faithful steed dropping on her knees, and as Babieca never did anything irrational, her master knew some mystery was the cause. A wall was pulled down and a crucifix was seen with its accompanying lamp still burning as brightly as in the days before the Moors came, therefore the church must become 'The Christ of the Light.' Jewish remains also are of striking interest in this town of many memories, and El Transito and Santa Maria Blanca, so Moorish that Arab workmen are supposed to have built them, testify to the peaceful times the Jews enjoyed under the Mahometans. Not so when the Christian was in power again ; then every Jew's head was taxed at thirty pieces of silver, and had not these persecuted people made clear to their enemies that they had no part in the finding of Caiaphas at the trial of Christ they would not have been allowed to keep their synagogues. Their worst troubles occurred in 1454, when San Vincente Ferrar meted out terrible cruelty to them. This saint, according to Mr. Hare, was a strange compound of personal piety and prejudiced brutality — such a character as George Eliot perhaps had in mind when she described someone as being 'pinched here and protruberant there.' What strange people must have walked through the old Sun Gate down there on the Vega ; if it could only talk what tales it might tell! Within a short distance of it is a convent on which hang in lines the chains of Christians taken at the Moorish conquest. But there is so much to dwell upon everywhere, and the touch of romantic history is over it all, even the rosemary herb which grows all around has a legend attached to it connecting it with the daily life of the Virgin during the infancy of her son, and the people still believe it bears fresh flowers every Friday to remind them of the Crucifixion.

A STREET IN TOLEDO.

But old cities, like old times, must give way to newer, and so with regret at the shortness of our stay we leave our Fonda Lino, the bridges, and the high road, and are soon flying away from it all, as fast at least as a Spanish train can take us. By the way, in that same train, as in all we have travelled by, are a couple of members of the Guardia Civile, the men who have almost cleared the country of brigands ; they are armed and wear uniform and when possible occupy a compartment by themselves, but in a full train they mix with the other passengers. They are said to be absolutely incorruptible ; like all Spaniards, high or low, they are most polite to everybody and expect politeness in return ; indeed, in Spain, accommodating manners to classes is unknown, and would be a great offence if introduced. We are soon in Madrid, and next morning leave the Atocha station for

ZARAGOZA,

and for thirteen hours run through beautiful scenery seldom interrupted by any quite unpleasing. Wild mountains on each side of us, with rivers, torrents, and waterfalls, then a little station with the usual cry of 'Agua! Agua!' the Aragonese peasants buying a glass and looking so picture-like the while, with their brown skins, their black hair showing under turbans, and a swathed band round the waist, tied so as to form folds that serve for pockets in which knives and other necessaries are stored, then a sunset of brilliant colouring, and at last the busy town we are making for. It is a mixture of ancient and modern, and contains two fine Cathedrals ; Seo, the oldest, has some Moorish work incorporated with its walls, and its ornamented floor is an exact copy of its ceiling. Walking from it to St. Mary of the Pillar, we passed the most thoroughbred group of gipsies possible to see, just the very kind George Borrow tells of in his 'Bible in Spain.' As that book was written fifty years ago, and the gipsies were then said to be vanishing fast, we were delighted to have this opportunity, and only wish the kodaks that were levelled at these blackest of black-haired and whitest of white-teethed people had done their duty ; but these little instruments never, never do that when the very best chances are before them. And so we have no photograph of them to illustrate these words. If we could only have understood the Gitanos' lingo, some of the party would have had their fortunes told on purpose to have seen the expressive features of the sibyls in full play. Well, we soon after saw another sight less interesting but equally curious ; a few hundred yards often include the Antipodes of thought. Following the crowd that entered the church of El Pilar, we saw a group, chiefly women, kneeling before a relic and devoutly kissing it—this was a portion of the pillar on which the Virgin descended when she wished to intimate to the presiding bishop her desire to have a Cathedral here. In the Square near women were drawing water from a common fountain, using for the purpose long trumpet-shaped pipes, and in the shops close by were skins of wine exhibited for sale. Nor were these the only ancient customs we observed, for early one morning hearing outside our hotel the tinkling of bells similar to some we remembered to have heard in Athens, we made for the window, and there indeed we saw, as we expected, a flock of goats being driven by a woman from door to door to supply the householders with new morning milk. Those little creatures appeared well treated, but not so the horses ; again one shudders to think of what these undergo in this town of the heroic siege against the French in 1809. Strange that people can be so brave with respect to themselves and so cowardly to creatures weaker than themselves. This matter of the treatment of animals was so

curiously uneven in the towns we visited that one felt compelled to enquire the cause. It was our good fortune to have an opportunity of being accurately informed by a gentleman who had spent a considerable time near London, and spoke English almost perfectly. It seems that there is no parliamentary legislation with regard to animals, but there is a kind of local option; hence in some places there is nothing objectionable to be witnessed, whilst in others it is quite otherwise. Happily a better feeling is gaining ground, and whilst on our holiday an account of the founding of a S.P.C.A. was given in the London papers.

From Zaragoza we journeyed next to

TARRAGONA,

the home of the Barcelona nuts and the growing port of Tarragona wine. It is a gloriously situated spot, facing the Mediterranean; the air is clear and soft, and seems only to carry sweet sounds—even the street boys' voices are quite musical. Its antiquities are great and very antique. The Cyclopean walls have a date lost in the mists of time, and the Roman aqueduct, which stands a fine ruin, tells of pre-Gothic Spain. All the way to it one drives through nut fields and past banks of flowers dear to the eye of the botanist. Indeed our botanist-in-chief made mad leaps from the carriage every now and then, much to the alarm, at first, of the driver who seemed to wonder why he should have been chosen to carry so erratic a fare. The Cathedral could not be missed; it is magnificent and dates from 1131 A.D. Santa Siela, the first of virgin martyrs is the tutelar, and a fine chapel is dedicated to her. Some exquisite carving adorns the screen, which grows upon the eye the closer it is inspected. The portal of the west front contains many niches occupied by saints, but some are missing, and the popular mind is said to believe that some of the saints become tired of their position, and that one by one they come down at a hundred years' interval and walk away. Our visit happening at Easter, the tapestries used during festivals were on the walls; it can scarcely be said they were ornamenting them, as to the uninitiated they have the appearance of carpets being hung on lines for beating; but these were historically interesting, as in pre-Reformation time they had in this way done duty in St. Paul's Cathedral and were bought in London when Henry VIII. sold off the church furniture. But according to Murray's 'Guide' and also O'Shea's the cloisters are the crown of this Cathedral; they enclose a lovely sunny garden, and in spring-time look as inviting as summer would make them with us. This was the first town in which we all wished to stay longer for the mere enjoyment of its climate, but it could not be, and so we took up our 'carriages' like one who was also travelling when Tarragona was young, and we commenced our pilgrimage to

MONTSERRAT,

distant 31 miles from Barcelona. To Monistrol we went by ordinary train, but beyond to the monastery by Funicular. Montserrat (jagged mountain) is about eight leagues in circumference, and its glorious pinnacles reach 3,500 feet in height. The scenery as one creeps up the mountain side is quite without parallel anywhere in the world, and fills one with a sense of awe at Nature's stony grandeur. Here and there are wayside shrines, and from the train-windows can be seen lines of country people slowly climbing up to do homage at them. But the most celebrated shrine is that at the top, or near the summit, where is a fine convent overlooking a gorge. Its predecessor was sacked by Suchet, who carried away its treasures and slew many of the monks. Their order is one that never sees again the outer world when once these rock-bound walls are entered. In the beautiful chapel their voices can be heard in the mass, but they neither see nor are seen of the congregation. There is a famous black Madonna above the altar, said to have been miraculously discovered somewhere near. She is held in high honour, and many young people who come up the mountain to be married ascend a staircase behind a screen and kiss the Virgin as the first act of their married life. We saw one young couple doing this, and we followed behind and looked at the image they so devoutly saluted. The wedding itself was a pretty sight. The stately figure of the bride, clad in black velvet and head covered with a long white veil, and the little interruption which took place in the middle of the ceremony when she embraced her mother, who stood behind, the candle-lighted chapel and the gorgeous gold-thread dresses of the officiating priests, made a very effective picture.

The monastery authorities keep up a *hospederia*, or guest-house, which is a favourite summer resort, not only for the newly-married, but for all who seek change in mountain air. The rooms are monastically plain and ill-furnished, and by ten o'clock all must be quiet within them; outside a night watchman keeps guard, walking in list shoes up and down the corridors. All meals are taken in the fonda near, where an excellent *cuisine* is established. A three days' stay is usually permitted, but may be extended by permission. The rate per day is about five pesetas (2s. 6d.). Most people try to climb the summit, where they are rewarded by a wonderful view over the whole basin of the mountain, and by wonderful flowers and birds as they toil up. The eagle and the raven are seen there at home. The little shrines and grottos on the way, though not what they were, remind one of the times when the founder of the Jesuits came here to found a retreat. Descending to the plain, the Llobregrat is seen winding slowly along, and there in the distance are the Pyrenees. The train is waiting at Monistrol, and, seeing the jagged mountain nearly all the way, but fainter and fainter, one is soon again in

BARCELONA,

the brightest and largest of Spanish ports and the second city of the kingdom. No wonder invalids flock here to winter; there is something so invigorating in the general cheerfulness of the place. Even in the neighbourhood of the docks high palm trees border the roadway, and electric light shines out from among their flowers at night, making a business part like fairyland. And then the Rambla, or high street of the town, is quite the finest yet seen; the trees are in their fresh green, and shadow the crowds who walk beneath either on business or pleasure bent. It ends in the flower market, an uncovered Covent Garden, on either side of the way, where flowers which are exotics with us are sold in large bunches for five centimos (a halfpenny); and the flower market ends in the bird market, and for those who do not suffer at the sight of a caged winged creature this adds further to the beauty of the long promenade. Down the side roads are excellent lines of shops, where fans and articles of *virtu* are in great abundance. At the end of some can be seen the far-off Montserrat. The mills are outside the town, and the working people live chiefly in the suburbs, which perhaps accounts for the happy, prosperous look of all the Barcelonese you pass in town. There away at the water's edge is a mount, and near it a statue of Columbus, on the spot where the great man landed on his return from discovering the New World, and was publicly received by the monarchs of Spain.

Barcelona Cathedral was finished in 1448. It is Gothic, of cruciform plan, and sober and simple in style. Its stained windows are said to rank among the best in Spain, but they do not admit much light; in so sunny a country shade is more desirable than light, and the dimness is refreshing after the glare of the streets—indeed, at first you are almost blinded by it, but the eye soon becomes used to it, and then a solemn charm is given to the whole. On the Sunday of our visit a Dominican friar was preaching, and, judging from his impassioned style and the deep attention paid by his hearers, the sermon was doubtless good. The spectacle of the congregation was most picturesque. No pews, and but few seats, and those either camp-stools carried by the worshippers or the steps leading to the crypt or the base of a column. The ladies in their new mantillas, the men standing in any posture that was easiest, fine music, then a hushed calm, the building itself, all made up a combination not easy to forget. Whilst viewing all this, the eye suddenly fell on the effigy of a Moor's head above the porch door. The frightful thing was placed there, it seems, to keep up the feeling of hatred against the Saracens. One remembered how our own houses, dedicated to the Prince of Peace, are museums of torn standards and bullet-riddled flags and warlike sculpture, or this would have seemed incongruous. But the service is over, and many of the people will attend the bull-fight this afternoon, while we intend to see what we can of the populace on their rest-day. Very neat and very orderly in a quiet street crowds of

them may be seen dancing a grave, slow dance, old and young joining in it equally, and every now and then a cart comes by and the ring has to be broken, but it soon joins again, and on goes the funeral-like pastime. Before leaving the town the Town Hall is to be visited, where Fortuny's unfinished picture hangs just as he left it when his life prematurely ended in Rome. And the University, where a normal school for teachers is established; in its degree room are the names of many great men, among them those of our Watt, Bacon, and Shakespeare. And, of course, no teacher could omit an opportunity of visiting an elementary school; but more of that in our next and concluding paper, when all that could be gathered in so short a visit on education will be told. Suffice it to say that, though O'Shea says education is popular in Barcelona, the school we visited seemed to be seventy years behind those at home.

We signalised the end of our stay in Spain by visiting the Frondon to witness the ancient game of Pelota played by some young representatives of the ancient people called Basques. This race, like our Welsh, maintained their independence among the mountains, and have never mixed with

GATE OF THE SUN—TOLEDO.

the rest of the people. They speak to-day the earliest language of the country. They are muscular, hardy, and brave, and their national game, though somewhat degraded, like our football, by the accretion of gambling, is very interesting to all Spaniards when played for play's sake only. It somewhat resembles the game of Fives, and is played in a kind of Fives Courts. Box-seats are provided for the spectators, who view with enthusiasm the changing numbers that a boy registers at the end of the room. Sometimes a ball flies too far and strikes a looker-on; but accidents are not very frequent. The play ends about midnight.

And then, quite agreeing with Washington Irving, who said on quitting Barcelona, 'One enjoys the very poetry of existence in these soft southern climates which border the Mediterranean; all here is picture and romance,' we turned our faces homeward, and, with short rests in Carcasonne, Toulouse, and Bordeaux, were soon in Paris, and in no great time after were discounting our last franc at Victoria for a suburban railway ticket.

After all the beauty we had seen, the contrast was sharp; but still for our own foggy little island it was easy to say that absence had only made the heart grow fonder.

J. M. DAVIES.

FREEING THE EVENING SCHOOLS.

THE present active London School Board has done, we think, an excellent thing in agreeing to free its evening continuation schools after the present session. If the wisdom of this step requires support, it may be found in the increased attendance which has already followed an almost moribund act of the last Board. That act which graced it more than many of its more vital doings, was to this effect:—if an evening scholar should make during the winter session '97-'98 three-fourths of the possible attendances he or she should be entitled during the next session to attend school free of charge. As soon as this was generally understood, a considerable gain in attendance took place.

Of course, so important a step as freeing its evening schools by the School Board was not allowed to pass unnoticed by the daily press. Journalists and public alike, whatever the shade of their politics, cannot fail to recognise that the hardest nut the statesman, the philanthropist and the social economist have to crack to-day is the condition of our metropolis, unique for its population in the history of the world. Whatever affects this 'huge idea wen,' as Carlyle termed it when it was less than half its present size, affects more or less directly the whole empire. And though the measures which are taken in its educational parliament occur so quietly that the affairs of Klondyke or some other far off spot eclipse them in attracting general attention, yet the far-reaching effects of those measures will be felt for good or ill by British citizens when Klondyke and its gold have been long forgotten. There is no problem more worthy of the best brains of the best men, than how to deal effectually with the enormous number of young Londoners.

Those who feel that sufficient help has not yet been given to them when their school-age is passed could not but be sorry to see in an evening contemporary a letter from a correspondent, who was evidently a teacher, informing the public that evening school teachers themselves regret the freeing of the schools because it may bring about next session a rush of young roughs into the schools. In the same paper there appeared, a day or two later, another letter, also evidently by a teacher, which pointed out that there must be something good latent behind the roughness of these undesired ones, or they would not trouble a school at all. Also it was shown that these same unwelcome ones were two or three years ago quite welcome in their day schools as boys or girls giving only the ordinary amount of childish trouble, and that a gap which some educational agency should have bridged over had been allowed to occur in their career since those school days. The writer, after trying to show that those who might be a bane in a school could not be a blessing in the streets, suggested that the dread said to be felt by the teachers only proves that something is wrong with our methods instead of with the principle of continuing the education of our boys and girls. The introduction of cadet volunteer corps with good bands of music was advised, and several other disciplinary measures; it was also said that a change in the teaching staff of many schools would be of advantage. Many of the evening workers are those who have already during the day exhausted their mental energy in another school; these perhaps do feel some inability to struggle with strong young life. Specialists and ex-day teachers are frequently found to be most successful, bringing as they do fresh powers to their duties. Indeed, in the case of the girls' schools, many ladies, unable to give more of their time to teaching, but unwilling to quite sever their connection with it, have been found to be quite in their element when so employed.

It will be interesting to all educationists to watch what the results of the freeing will be when next session arrives.

Elementary Lessons on Brush Drawing, fully illustrated, by J. Vaughan, Art Master, School Board for London, appear month by month in the PRACTICAL TEACHER'S ART MONTHLY, price Twopence.

LONDON POLYTECHNICS.

III.—NORTHAMPTON INSTITUTE.

IT was on a biting February morning that the PRACTICAL TEACHER'S interviewer set out to explore the Northampton Institute, one of the three branches of the City Polytechnic, the other two constituent parts of which are the Birkbeck Institution and the City of London College.

Who does not know Clerkenwell? What thoughts of prisons, prisoners, and explosions, of clocks, watches, and jewellery come jumbling into one's mind at the bare mention of the name! And then what teacher does not remember that one of London's finest Board Schools—the Hugh Myddelton—has ousted the gloomy prison, and now stands a living monument to the efficacy of education as a crime preventive and a prison destroyer. Surely it would be difficult to find a more interesting locality than that in which this latest Industrial University has been so sagaciously located. To the workmen and workwomen of this busy community the Northampton Institute, catering most bountifully as it does for their betterment in their hours of work and of leisure, must be a veritable Palace of Delight, an *alma mater* in the truest and best sense of that much-abused term.

With a courtesy for which we tender thanks sincere and hearty, we were received by the genial Principal, Dr. Walmsley, F.R.S.E., in whose hands we opine the future of this great Institute is more than safe. Before starting round the huge building, we had a conversation with the Principal, in the course of which we learnt what the Governors and well-wishers of the Northampton Polytechnic wish to achieve, which, put briefly, is nothing less than the salvation, both industrial and social, of the hive of busy workers who inhabit classic Clerkenwell. 'In the Workshops and Laboratories of the Institute there is,' said the Doctor, 'no place for the *dilettante*, or, indeed, for anybody except the apprentice, the workman, the foreman, or the master man who wishes to become up-to-date in all that appertains to his art or craft.' Here are no South Kensington Classes, no Matriculation or Degree Courses, but on all sides is to be found ample provision for the acquirement of the most approved technology of the trades of Clerkenwell. This is well set out in the Institute's book of announcements: 'The educational aim of the Northampton Institute is to provide classes in Technological and Trade subjects, a branch of educational work scarcely touched by the sister Institutes. To this end attention is first paid to the immediate requirements of Clerkenwell, the district in which the Institute stands. This district, as is well known, is thronged with small workshops engaged in a variety of trades, amongst which Watch and Clock Making stand out as the most prominent, though by no means the only important trade of the district. Mechanical and Electrical Engineering Workshops (including in the latter Electroplating and Electrotyping) and Art Metal Workers in great variety also abound.

'As many of the workshops are small, the need of an all-round training for the workmen in the principles and practice of the different sections of their trade is more urgent than in large workshops, where the work of production is subdivided very minutely. It is hoped therefore that both employers and workmen will co-operate with the Governing Body in their endeavour to meet the educational necessities of the district, and to provide sound technical education adapted to the different classes of workers.'

Herein is contained the indication and justification of the policy of the Institute. Dr. Walmsley informs us that the work is divided into three sections:—

I. Mechanical Engineering, Metal, and Building Trades.
II. Electrical Engineering and Applied Physics.
III. Artistic.

He also makes it clear why there is no connection between his Institute and the Department of Science and Art. It is not because of any ill-feeling on either side; indeed, the Science and Art Department has rendered very neighbourly help in loaning to the Institute a case of artistic goldsmiths' work, for which Dr. Walmsley is duly grateful. It is because science, as expressed in the South Kensington Syllabuses, is of no use to the craftsman, whose weal is the Doctor's first care.

Now, as the Northampton Institute could do very well with the large grants that must come from a connection with the Science and Art Department, it struck us as somewhat anomalous that such a connection should be regarded as undesirable; we remember that a similar state of affairs prevails at the Finsbury Technical College. Surely it is the duty of the Science and Art Department to have part and lot in this matter of the proper technical equipment of Clerkenwell, and surely the authorities are not so blindly wedded to their examinational system as to refuse to see excellence except through these examinational spectacles. In any other country a large grant would be forthcoming without examination, and it should certainly be forthcoming here. In talking about the equipment of his Institute, Dr. Walmsley made one or two statements that did not fall welcome upon the ear of your representative, who is a firm believer in the supremacy of the British Workman and of the Trades Union. How unpleasant then was it to hear from this enthusiastic purveyor of technology, that in striving to fit up his workshops and his laboratories in the most efficient manner, he had perforce to get a good proportion of his tools, not from Germany, but from America, 'for,' said Dr. Walmsley, 'the Englishman, formerly *facile princeps* in the manufacture of tools, has allowed himself to be outstripped in this respect by his American cousin, who makes tools better and cheaper than his English compeer.' Knowing how well Dr. Walmsley is qualified to judge, and also firmly persuaded that he would fain yield the palm to his countrymen if he could do so honestly, this came upon our ear very unpleasantly. Asked to explain, Dr. Walmsley did so by quoting a case. A friend of his desired to have some radiators, and to this end he issued tenders. Now it chanced that the town in which the radiators were to be used had a foundry where radiators were turned out. Naturally the friend hoped that the local firm would get the contract. What then was his surprise that an American firm quoted prices fifty per cent. lower than those of the local foundry. Remonstrance elicited the following explanation: The American radiators were lighter by one half than those of the local man, and on this account they were cheaper. The local man could not, however, make radiators of this lighter stamp, because the men, who were paid by weight, were forbidden by their Union to make lighter radiators. We print the story for the edification of our readers who, granting the truth thereof, can see why foreigners secure contracts where Englishmen fail to do so.

Dr. Walmsley is most anxious to secure the co-operation of the employers of labour, to whom he looks for support in his attempts to overcome the apathy of the worker in the matter of making himself skilled in modern methods. For, strange as it may seem, there is much reluctance to be combated before even a fair proportion of the Clerkenwell operatives participate in the good things offered to them by the Northampton Institute.

This must not be thought to mean that students have not been forthcoming in this the first session of the Institute's work. So far from this being the case, there have been not less than seven hundred of them enrolled, who between them have taken no less than fourteen hundred class tickets, and the cry is, Still they come; so that compared with other institutions, the send-off of the Clerkenwell Polytechnic has been very gratifying. But before long it is hoped that the studious artisan—intent upon the maximum of skill and information as to his *métier*—will haunt the Institute in his thousands, for which ample provision has been made, there being upwards of one hundred and fifty large and commodious rooms, some of which are still awaiting the behest of the artisan as to how they shall minister to his improvement.

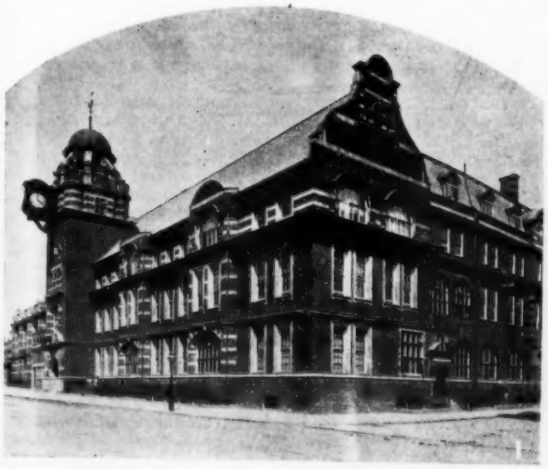
Bidding good-bye to the worthy Doctor, with every good wish for the ultimate and complete success of his University, we started on our tour of inspection. Fain would we take our readers with us, but a whole number of the PRACTICAL TEACHER would be required to say all we would. We must then perforce draw attention to the most important of the sights that we saw in the course of our two hours' march round the establishment.

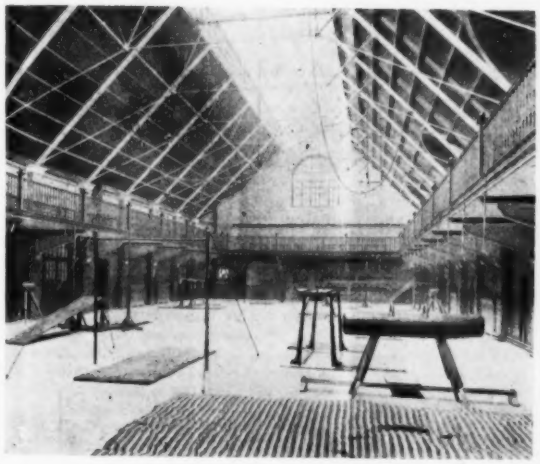
The Engines.—For providing the various Workshops and Laboratories with power there are two 100 h.-p. engines, the one an ordinary boiler made by Adamson, of Dukinfield, the other a Scotch furnace by Babcock and Wilson. It is needless to say that with so much power the Institute drives its own dynamos (and beauties they are too, one by Holmes, the other by Willans), and so generates its own electricity. In addition, they may on occasion switch on to the mains of the Clerkenwell Company, so that a double installation is available.

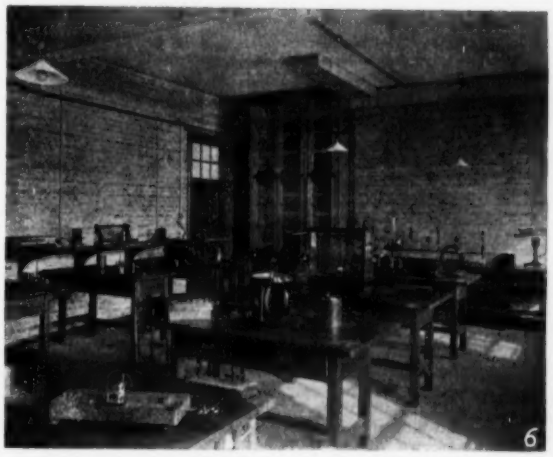
Thence we passed in succession through a series of **Workshops** and **Laboratories**, which for equipment, for airiness, and for convenience of planning could hardly be surpassed. Many specimens of the work of the students were *en évidence*. In the carpenter's shop was noticeable a staircase beautifully executed. In the material-testing shop was a piece of cement, the breaking strain of which had overnight been ascertained by a patent cement testing machine. In the brick cutting shop again were to be seen many of the bricks, upon which the more or less prentice hands of the students had set their mark. Everywhere was conspicuous the intelligent striving towards higher things, and dull indeed would be the mind that could not realise clearly how direct and how potent must be the bearing of these industrial classes upon the output of English workshops.

THE NORTHAMPTON INSTITUTE.

(THE CITY POLYTECHNIC.)







1. EXTERIOR VIEW FROM ST. JOHN STREET ROAD.
2. ARTISTIC CRAFTS DEPARTMENT—DESIGN ROOM.
3. THE GYMNASIUM.
4. ARTISTIC CRAFTS DEPARTMENT—MODELLING ROOM.
5. THE LIBRARY.
6. SENIOR PHYSICAL LABORATORY.

From Photographs by S. B. Bolas and Co., 77, Oxford Street, W.

To show how careful the management are in providing exercise in the most approved modern methods, and with tools embodying the most recent improvements, we give an extract from the syllabus for Practical Smith Work, 'Gas furnaces and brazing tubes having recently come into use for all classes of work, it has been considered advisable to introduce them into the smithy that students may not only carry out ordinary smith's work, but also be taught the management of a new type of heating appliance. This should be of great value to the smiths of this district, as it will enable them to thoroughly test the merits of a new departure in the trade." And so all along the line the Clerkenwell artizan is brought face to face with the newest and the best in the way of machinery and tools, and is thus encouraged to go ahead and not to be content with marking time until trade shall have bidden him a long farewell.

In the **Artistic Crafts Section** are to be found classes bearing upon the many local industries in which art should play a prominent part and the path of the student is smoothed as much as possible by giving him a course containing nothing redundant, but everything necessary to the proper understanding of his particular trade. The sub-sections here, are (1) Modelling, (2) Goldsmith's Work and Jewellery, (3) Wood Carving, (4) Silversmith's Work, (5) Chasing and Embossing, (6) Decorative Metal Work.

The **Art Rooms** are on the top floor of the building and are magnificently lit by large windows extending from the floor to the ceiling. In one of these rooms was the case of loaned specimens to which reference was made at the commencement of this article. In another room we saw many examples of the work of the paper designer one of which was very striking. In order that there may be no doubt as to effect, the designs in this room are executed on the walls themselves. We were taken at this juncture up into the dome, where hangs a peal of five fine bells awaiting connection with a handsome clock that Messrs. Dent have had in hand for two years, and which shortly after our visit was placed *in situ*, ready for the formal opening of the Institute by the Lord Mayor.

The **Women's Section** is no less efficiently organised and officered than that devoted to the needs and necessities of the sterner sex.

The Head of this Department is the Lady Superintendent—Mrs. Winton Thorpe—The two divisions of this section, are A—the Domestic Economy School, B—the Women's Trades.

The Domestic Economy School is the only Day Department of the Institute. About forty girls—the lucky holders of County Council Scholarships, and mostly hailing from the neighbouring Board Schools receive a good grounding in the following subjects :—

(1) Cookery and Chemistry of Food.
(2) Housewifery.
(3) Laundry Work.
(4) Dress Cutting and Dressmaking.
(5) Plain Needlework.
(6) Hygiene.

at the hands of Miss M. A. Gibbs, the Head-Mistress, and her two assistants. The man who is lucky to get one of these girls for a wife later on should have no just cause to complain of badly cooked food or of an ill-kept home. Of the worth of this branch of the Women's Section there cannot be two opinions. In addition to to these Day Classes for Scholarship Girls, there are evening classes in the same subjects for women as well as in Home Millinery and Nursing, the Institute being one of the centres for St. John Ambulance Lectures. As to women's trades, the same watchfulness is shown to meet the wants of the locality, as witness the following : 'As there are in Clerkenwell and its immediate neighbourhood many artificial flower makers, it has been decided to start a class in this subject in the Women's Trades Section of the Institute. These classes will only be open to those who are already engaged in the trade ; for it is very clearly recognised that deftness of hand and rapidity in good work cannot be acquired in a technical class, but can only be reached by long practice in the factory or elsewhere.' Here is the syllabus for this interesting branch :—

'Flowers to be copied from natural forms :—Chrysanthemums, Lilies, Lilacs, Marguerites, Hyacinths, Elder Fowers, Laburnums, Wistarias, Wild Roses, Guelder Roses, Nasturtiums, Roses, Carnations.

All flowers will be made from white materials (silk, velvet, muslin, etc.,) and will be coloured, made and mounted.'

Then again the convenience of the students is considered, as to time, the above class for example, being held between the hours of eight and ten p.m.

Millinery is another branch of the Women's Section, the aim being to produce professional milliners and not to provide for home exigencies as in the Home Millinery. For the information of our lady readers we give the syllabus in this Department likewise.

'Bow making ; Shape Making (Wire and Buckram); Plain Covering ; Head-lining ; Wiring and building ; General Trimming; Velvet Folds and Rolls ; Caps ; Toques.'

Here again is evident the determination of the Governing Body to exclude all non-workers, as 'the course will only be open to apprentices and others actually engaged in the millinery trade.'

Dress-making and Tailor Cutting is the other division of the Women's Trades Section. Only apprentices, etc., are eligible, and a thorough grounding in the art of cutting out is given from 8 to 10 p.m. on Tuesday evenings.

A good future should await these admirable classes for women.

And now we must turn to the social side, a feature in itself sufficient to supply a *raison d'être*. Second only to the East End for dreariness, Clerkenwell must indeed be able to appreciate the many opportunities for social intercourse of the most excellent description that the establishment of the Northampton Institute in their midst has made possible. A magnificent Concert Hall, capable of seating 1,300 people, provided with an organ constructed by Binns, of Leeds, ministers to the wants of the associates and members and their friends so far as concerns public entertainment.

When we say that this large Hall is utilised every week for Society 'Pops,' amongst which on Saturday, Jan. 22, figured a performance of the 'Messiah,' it will be understood how beneficial this portion of the work may be. But it is inside the building that the social side looms largest and is seen at its best. Two large rooms fitted almost luxuriously are set apart, the one for women, and the other for men members, whilst hard by is a Refreshment Department which at a very modest tariff provides creature comforts for the fortunate members, whilst in the Women's Room is located an excellent cottage pianoforte, upon which sweet music may be discoursed ; and then, there is the reading-room provided with the leading dailies, both morning and evening, as well as the usual magazines, and, for the benefit of the students, all technical periodicals. The library is already beginning to assume considerable dimensions, and constitutes a by no means unimportant feature in itself.

Then there are the clubs, sixteen in number, ranging from chess to cycling, for the proper housing of which some cosiest of Committee-rooms are provided.

And what shall be said of the Swimming Bath, a hundred feet in length, which is reserved two evenings in the week for the lady members? Surely this is a feature of which Clerkenwell will make good use. But the adjoining gymnasium, unusually large and fitted with every detail dear to the gymnast, is equally serviceable and equally popular, and is rightly, like the Swimming Bath, set apart two evenings per week for the sole use of the ladies.

When one remembers the dismal Clerkenwell surroundings and reflects upon the transformation accomplished by this Institute, the conclusion is irresistible that the change is not dear even at the cost of a hundred thousand pounds; and for this much of the work of the City Guilds, for whose examinations, by the way, Northampton Institute students do prepare, nothing but the highest praise can be given.

Here is a circular which will show how anxious are the Management that the artisan shall reap to the full the benefits of the Institute —'Students living at a distance but working in the neighbourhood of the Institute, are reminded that the Refreshment Rooms and Lavatories of the Institute are open from 6 p.m. The table of technical periodicals in the reading-room, and the technical section of the Library, can be used by the students, and ample cloak-room accommodation is available. Students have also the privilege of joining the gymnasium.' That both employers and workmen will become deeply alive to the advantages offered by this unique Industrial University, and that they will put themselves within reach of its many-sided and potent influence, will be the patriotic wish of all who appreciate to any extent the greatness of the work that is being done by the magnificent Institute over which Dr. Walmsley so ably presides.

THE OXFORD SHORTHAND CO. wish us to state that at the recent examination held at Dover for the coveted 'Member's Medal,' annually offered by Mr. George Wyndham, M.P., and open to all boys at school there, and to all systems of shorthand, the victory fell to the Oxford shorthand, for the ninth year running, the winner scoring 760 marks more than the highest candidate using any other system. Major E. H. Rogers, late H.M. Inspector of Army Schools, and the editor and proprietor of *The Dover Express*, were the honorary examiners, and described the results as 'remarkable.' This Company are issuing an entirely new set of writing-books and exercises on a novel plan, which all interested in the school-teaching of shorthand are invited to examine. Application for further particulars should be made to The Oxford Shorthand Co., Dover.

AN ARTISTIC PILGRIMAGE.

TO one who has attended more than a score of Conferences of the N.U.T., and taken part in many a lively debate, it was a welcome relief to absent himself from the Conference Hall for one half-day, and so escape from the wear and fret and strain of listening to contentious talk. On his first arrival in Cheltenham the present writer had noticed with interest the announcement that a religious picture, '*Noli me Tangere*,' was on view in the town, and during the Conference he had been fortunate enough to be introduced to the artist, Mr. J. Eadie Reid. It was then with no slight pleasure that, having met Mr. Reid by appointment in that most charming of avenues, the Promenade, he devoted his 'half-day off' to a walk through some of the fair streets of his native town on a sort of personally conducted artistic pilgrimage, the gifted artist being the guide, and some of his most important works being the objects of the visitation.

Let it be said here that Mr. Eadie Reid is an artist who has studied much in Italy, and so become imbued with the spirit of the early masters of religious art. He has been a special pupil of Sir William Richmond, R.A., whom he has assisted in producing many important decorative works; and for the last five years he has resided near Cheltenham, where he holds the post of Professor of Mural Decoration in the Ladies' College, and where he has produced many beautiful and interesting works for the decoration of churches in the town and neighbourhood.

From the Promenade we proceeded first to Whitcombe's Fine Art Gallery, where the new painting was on view, previous to being placed as the first of a series in the parish church of St. Mary's, Lydney. There were also many other pictures, sketches, and studies in various stages of progress, to illustrate the work of Mr. Reid, and to add to the interest of an examination of the truly beautiful work—'*Noli me Tangere*.' But what in the present instance added most to the interest of the view, was undoubtedly the delightful talk of the artist, and his unaffected comments on the nature, meaning, and methods of his work.

'NOLI ME TANGERE.'

The picture which holds the place of honour in the gallery represents of course, that remarkable meeting between Christ and Mary Magdalene on the Resurrection morning, when the woman having come to the tomb of her Lord and found it empty, begins to weep and inquire where they have laid Him. When His words make her aware of His presence, she turns round, saying Rabboni, and reaches towards Him, but is checked by the words 'Touch me Not' (*Noli me Tangere*). The painting is full of spiritual significance. While the brow and hands of Christ bear marks of suffering undergone, His head and features wear an unusual aspect of manly dignity, and His white garments, hanging in graceful folds, seem almost to shine with a mystical light from within. The face, figure, pose, and drapery of Mary combine to form a feature of great beauty. The two figures are at once finely contrasted and beautifully harmonised. The incident is one in which gentle restraint, rather than dramatic action, is the prominent element; and this characteristic, which especially fits the picture for its place and purpose, is wonderfully carried out. The accessories are extremely appropriate, and embody subtle suggestions of a spiritual symbolism which is neither conventional nor obtrusive. The background shows the dark mouth of the cave, with stately cypresses, emblems of death, and an apple tree, suggestive of original sin. In the foreground is a little rill, which may suggest the regenerating waters of baptism; brambles near the feet of Christ are reminders of His sufferings, and wild poppies emblems of sleep and forgetfulness. 'The breaking day suggests the dawn of a new era for humanity.' The light and colour are marvellously well managed, and the picture is one which well repays long and repeated examination.

The other works on view include a striking finished picture of 'Mary Magdalene at the Foot of the Cross,' in which Mary seems to be drawn upwards from a prostrate position till she just touches the foot of the crucified Christ. Her face is full of true feeling, of sorrow mingled with faith, and very beautiful. This work has been well reproduced in autotype. There is an altar piece in *fresco secco*, a process used by the fresco painters of Mediæval Italy. The colours are mixed with white of egg, and the result is greater permanence than is secured by the use of oil or any other medium. Mr. Reid attaches much importance, and no doubt rightly so, to the teaching of the nature of varying methods of artistic work. It helps the many members of Art classes who are unable to become artists to enjoy art more thoroughly because they can appreciate it more intelligently.

The gallery contains the cartoons for the large stained-glass window which has lately been fixed in the chapel of Holloway College, Egham, as well as sketches for stained-glass windows, altar-pieces and other frescoes which are already placed in churches in Cheltenham, Bishop's Cleeve, Upper Hatherley, and other villages.

From the Gallery we walked to Christ Church, in the southern part of the town, and examined the beautifully decorated semicircular apse, which is marked by an extremely harmonious and subdued scheme of colouring. It forms a remarkable piece of work, which took Mr. Reid a long time to complete, and constitutes an important step towards the suitable conversion of a very plain church into one of a basilican form. The subject is Heaven, and on the arch which marks the division between the apse and the body of the church are designs symbolical of Death as the Gate to Heaven.

Away from this, north-eastwards, in the district of Pittville, we found the handsome modern church of All Saints, a noteworthy example of a very ornate style of Gothic architecture. Here Mr. Reid had worked for a considerable part of almost every day for about a year on a fine fresco, representing six angels praising the Lord of Heaven by playing on various instruments. The figures are graceful and varied in pose, and seem to be rising from a number of olive trees, every leaf of which has been separately drawn and painted with

Next Month:

'WHAT TO SEE AT THE ROYAL ACADEMY.'

By a Practical Teacher.

the utmost care. In the examination of the design, and in fruitful talk about this work and other features of the church the time sped all too rapidly, and a companionship of three

MR. J. EADIE REID.

hours, which on one side had certainly been intensely interesting and delightful, had to give place to other engagements.

We are fully aware that this rather hurried account of a really leisurely walk and talk falls far short of giving any adequate idea of the personal charm of it; but it seemed fitting that some record of Mr. Eadie Reid's work should appear in this Journal as an addendum to our account of the Cheltenham Conference, for the illustration of which we were able to secure some hasty sketches from his artistic pencil. As one satisfactory result of holding this paper over we have fortunately been able to obtain permission to reproduce for our readers the beautiful picture above described and a photograph of the artist.

OUR SEARCHLIGHT COLUMN.

The War between Spain and the United States.

When the American commission, appointed to inquire into the cause of the blowing up of the U.S. steamship *Maine*, reported near the end of March that the destruction was due to an external explosion, it was felt at once that the strained relations which had prevailed were intensified, and the war feeling in the States became more pronounced. After much consideration President McKinley sent an ultimatum demanding the independence of Cuba. The proud spirit of Spain would not yield to such demand, and war was declared. Almost immediately several Spanish vessels were captured by American warships; but some of these were released, and others retained pending inquiry before a prize court.

The first important engagement was the bombardment, on April 27th, of Matanzas, a fortified town on the north coast of Cuba, about 70 miles east of Havana. This operation was connected with the scheme for blockading Havana, a task undertaken by several American warships which kept in touch with Key West as a naval base.

The Battle of Manila.

A few days afterwards came the remarkable attack made by the American Pacific squadron under Commodore Dewey on the Spanish squadron stationed in Manila Bay to defend the capital of the Philippine Islands Under cover of night on April 30th–May 1st, the American fleet of four cruisers and ten gunboats stole past the forts on Corregidor, an island at the entrance to the bay, and got close up to the Spanish ships without being observed. In the early hours of Sunday morning all the Spanish warships, eleven in number, were destroyed or rendered helpless, the fortress of Cavité, about seven miles from Manila, was razed to the ground, and Manila itself was at the mercy of Commodore Dewey. The Spaniards fought bravely, but they were ill-prepared and altogether over-matched by the well-equipped and skilfully managed American vessels, though Dewey admits that with his present force he is unable to occupy Manila. This serious blow is regarded as involving the capture of the Philippine Islands, now perhaps the most valuable of the Spanish possessions. The news of defeat has had a great effect on the

State of Spain.

There is widespread discontent: riots have broken out in many parts of the country owing especially to the high price of bread; martial law has been proclaimed in Madrid and over large districts; the export of food stuffs has been prohibited; a Cabinet crisis is threatening; the Carlists and Republicans are watching their chances; and the Government of the Queen Regent and her son, Alfonso XIII., are unwilling to sue for peace, as we may well believe they wish in their hearts.

The late Right Hon. W. E. GLADSTONE.

World-stirring as have been the events of the last few weeks, all thoughts of them are as we write overshadowed by the feeling of deep sorrow which darkens all English hearts on learning that the greatest Englishman of modern times has passed away. William Ewart Gladstone has for so many years filled so great a space in the public life, not only of England, but of the civilised world, that it is hard to realise that his work is ended, his eloquent voice for ever silent. But is it not also difficult to realise how great his work has been, how far reaching have been its influences?

Descended from a Scotch stock, Highlander on his mother's side, Lowlander on his father's, he was born at Liverpool on the 29th of December 1809. From his childhood he seems to have had the character of an earnest worker. After a period of private tuition, in which Arthur Stanley was his companion, he went, at the age of eleven, to Eton. There he was distinguished by his sound progress and his ability in classical study. He was founder, editor, and chief contributor of the *Eton Miscellany*, a school magazine which lasted nearly a year, the last year of his stay at school. In 1827 he proceeded to Oxford, where his work was steady and the results brilliant, both in classics and mathematics; for it is said that in 1831 he took the most brilliant double first of his time. While at the University the bent of his mind and the strong influence of his character showed themselves in his becoming the centre of an Essay Society, and a brilliant speaker as well as Secretary and President of the Oxford Union.

On leaving Oxford he had thoughts of entering the Church, but this was vetoed by his father. In 1832 he travelled for six months in Italy, and made himself familiar with its language and literature. Recalled to England he contested the seat for Newark, and after an exciting campaign became its representative in Parliament, taking his seat in January 1833. From that date—with the exception of a short interval in 1846—he continued to be a member of the House of Commons till 1894, when he resigned, and retired to his home at Hawarden Castle in Flintshire.

During that period of over sixty years the history of his parliamentary career is practically the political history of England, and its remarkable interest has ramifying connections reaching into many foreign states. His first speech of any importance was made from a Tory standpoint, in defence of his father as a slaveholder in the West Indies. His last speech was a solemn denunciation of the Peers' Veto on legislation. In the interval he had travelled far and learnt much: but this is not the place to dwell on his great work as a Statesman. On that subject the journalists may dilate. Be it enough for us to refer to the prominent part Mr. Gladstone

took in connection with the repeal of the Corn Laws, with the extension of Free Trade, and Financial Reform; to the earnestness which he threw into his support of the movement for Italian freedom and Italian Unity; to his legislation with regard to the Irish Church and Irish Land Questions; to his famous campaign against the Bulgarian Atrocities; his Abolition of the Paper Duty and of Purchase in the Army; his efforts to pass a measure of Home Rule for Ireland.

He was M.P. for Newark from 1833 till 1846, for Oxford University from 1847 till 1865, for South Lancashire 1865 till 1868, for Greenwich from 1868 till 1880, for Midlothian from 1880 till 1895. His parliamentary progress was rapid, for he became a Cabinet Minister at the age of 33—as President of the Board of Trade. As Chancellor of the Exchequer he produced a series of Budget speeches which not only introduced great and beneficent financial changes, but were invested with such charms of eloquence as to keep the House of Commons spellbound for hours.

THE LATE RIGHT HON. W. E. GLADSTONE.

From Photo by [*F. Rowlands, Hawarden.*

Mr. Gladstone was four times Prime Minister, from December 1868 to March 1873; from April 1880 to June 1885; from February 1886 to July of the same year; and from August 1892 till March 1894. And in his Cabinets he was no mere *roi fainéant*, for no member was more strenuous in the mastery of details, none more constant in attendance at debates, nor more frequent in intervention.

But his extraordinary activity as a Statesman was only one manifestation of many-sided intellectual personality. In religious matters, from the theological, ecclesiastical, and personal aspects, he showed a profound and continual interest from his schoolboy days till the end of his life. His first book was on 'The State in its Relations with the Church,' published in 1838; his last was a learned and exhaustive annotated edition of Bishop Butler's works, published in 1896. Other important contributions to religious controversies have occupied intervals of leisure from official duties, including the Vatican Pamphlets, a work on the Impregnable Rock of Holy Scripture, a reply to Professor Seeley's 'Ecce Homo,' a letter on the Validity of Anglican Orders, and some devotional books. It has been said that his knowledge of the Bible was hardly equalled and quite unsurpassed even by clergymen. But then, religion was of the very essence of his life in every department.

This element can no more be left out of any faithful sketch of this great character than his work as a Statesman; but there is another feature which may, perhaps, more appropriately receive attention in this page; we refer to his activity as a scholar. He was a ripe scholar of a class not now too frequently met with. He seems to have been steeped in a thorough knowledge of the Classics. He was so familiar with Homer, that it is said that he could repeat a passage *verbatim* if started at any line in the 'Iliad.' He wrote several works on Homer, including 'Studies on Homer and the Homeric Age,' in three volumes, published in 1858, and later 'Juventus Mundi,' and a small book 'Homer' in Macmillan's series of Literary Primers. Very recently he published a translation of Horace's 'Odes' into English verse.

His wide experience, profound scholarship, retentive memory, and versatility, made him a wonderful conversationalist; and we hear that his facility in French and Italian was equal to that in English. He was made Lord Rector of Edinburgh University in 1860, and of Glasgow University in 1877; but perhaps his connection with his own University of Oxford was what gave him the greatest pleasure. We have referred to his brilliant career as a student, to his representation of the University in Parliament for eighteen years, and we may mention his return for a brief period of residence in 1892, when he delivered the Romanes Lecture on the congenial theme of 'Mediæval Universities.'

One of the most touching documents relating to his last days is perhaps the reply he dictated to a letter of sympathy sent from his old University:—

> 'He bade me say,' writes Miss Helen Gladstone, 'there is no expression of sympathy that I value more than that of the ancient University of Oxford, the God-fearing and God-sustaining University of Oxford. I served her, perhaps mistakenly, but to the best of my ability. My most earnest prayers are hers to the uttermost and to the last.'

Space fails us to mention many interesting traits in the long full life of the great good man who has left us. His love of books, his rapid and almost omnivorous reading, his love of boating in early life, and of wood-cutting in advanced life, his regular reading of the Lessons in Hawarden Church when at home, even in recent years, his interest in old china, his appreciation of a good play, above all the sacred joys of home and family, in which he seems to have been, humanly speaking, supremely blest; all these can barely be glanced at. But they are features it is well to recall as we review the grand life now closed, as we express sympathy with his loving partner of nearly sixty years past, and other members of the bereaved family, and as we mingle our regrets with those of the sorrowing world.

And well may the world sorrow at the loss of this matchless combination of great intellectual, moral, and spiritual qualities known for more than two generations as William Ewart Gladstone—the clear insight, the love of justice, of liberty, of learning, of mankind; the simple manners, the blameless private life, the home-love, the unwavering faith, and unflinching courage which marked the greatest of Englishmen.

Our Monthly Retrospect

EDUCATION IN ENGLAND.

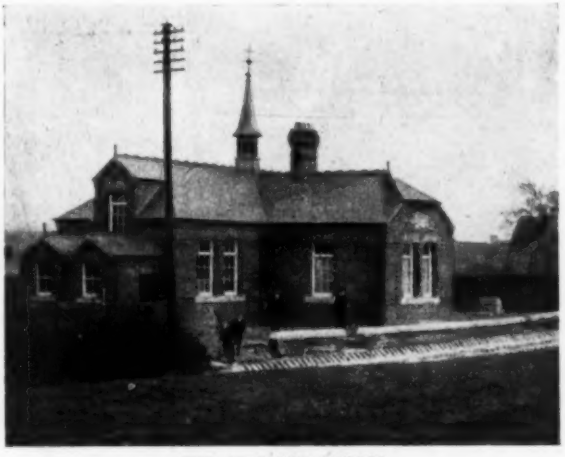
N.U.T. NOTES, &c.

BY T. B. ELLERY, F.R.G.S.,

1895-6 *President of the National Union of Teachers.*
1897-8 *Chairman of the Teachers' Benevolent Committee.*

Aycliffe once more. Many of my readers have followed the Aycliffe case with considerable interest. These will, I am sure, read with pleasure the following note from Mr. Thompson, the Head Master :—

> 'Please accept my most sincere thanks for your fraternal and sympathetic notes in the May number of the PRACTICAL TEACHER. I cannot say how cheering and comforting such expressions of goodwill are to one so oppressed as I have been lately, or how inspiring they are as to the future. You will, I know, be glad to hear that the new school—our "Venture of Faith" it has been called by someone—has begun work most auspiciously. I have now, excluding deaths (3) and several removals from the parish, exactly 130 on the registers, having admitted 20 new scholars since we entered our new premises, and our average attendance for the past two weeks has been 113 and 110 respectively. Our managers have secured me the help of a good assistant mistress, and altogether with a good staff, a comely building—well lighted, ventilated, and furnished—and with a united people at my back, the outlook is most promising, and success seems assured.
>
> 'I only pray that I may myself have health, strength, and energy to rise on the stepping-stones of my dead self to higher things, now that the "Battle of Aycliffe" has been fought and won.'



THE AYCLIFFE SCHOOL.

In concluding this note, may I ask those of my readers who have not yet subscribed to the Aycliffe Fund to send a donation as soon as possible, either to Mr. Organ, 71, Russell Square, W.C., or to myself. The smallest sum will be most thankfully received. Will the PRACTICAL TEACHER circle of friends assist us to raise the £200 still required to meet the cost of building and furnishing? Who says the first half-sovereign, crown, half-crown, or shilling?

The New Executive of the N.U.T. The first meeting of the new Executive was held at Russell Square on May 7th. Of the 36 members *eleven* are quite new to Executive work. They are Messrs. Donkin and Phillips (North England District), Mr. Holden (Lancashire District), Mr. Cohen (South Midland District), Mr. Caudle (South England District), Miss Williams and Mr. Jenkins (Wales), Messrs. Blackburn and Hurden (East London District), and Messrs. Bowers and Chiver (South London District). They had an eight hours' experience of routine business, election of committees, chairmen and vice-chairmen, etc., etc.—an experience that must have tried their patience to a considerable extent, if it did not actually make them wish they had never put their hand to the Executive plough. Still, it was all very necessary business, and there were several matters of principle to settle if the work were to go on smoothly during the year. When the labours of the day had ended, everybody, I think, was prepared to admit that an excellent beginning had been made. What enthusiasm there is in the N.U.T. world, to be sure! Have the members of the Union stopped to ask what the railway journey alone, after a hard week's work in school, must mean to Mr. Donkin (Tyneside), Mr. Phillips (Cumberland), Mr. Butland (Teign and Dart), and others? The discomfort, the self-sacrifice involved, must be patent to everyone.

The Chairmen and Vice-Chairmen of Committees. During the day the following appointments were made :—

Committee.	Chairmen.	Vice-Chairmen.
Education	Mr. R. Wild, B.A.	Mr. Allen Croft.
Finance	Mr. F. Peaker	Mr. T. Butland.
Law	Mr. S. Hicks	Dr. Beach.
Tenure	Mr. T. H. Jones	Mr. T. P. Sykes.
Organisation	Mr. M. Jackman	Mr. Gregory.
Parliamentary	Mr. Blacker	Mr. T. John.
Technical, etc.	Mr. C. Bowden	Mr. Sharples.
Voluntary Schools	Mr. Rankilor	Mr. Graves.
Superannuation	Mr. Ellery	Mr. Coward.
Ladies'	Miss Cleghorn	Miss Goodwin.
Rural and Small Schools	Mr. F. B. Gale	Miss Selvage.

The Charities: Festival Dinner. For the Festival Dinner this year the Committees were able to secure the services of Earl Beauchamp as Chairman. No better choice could have been made. His lordship's courtesy and hospitality at Madresfield in Easter week to the N.U.T. Conference Representatives made us confident he would preside over the Dinner in an admirable fashion. I need not add that our expectations were fully realised. Unfortunately the company did not reach the proportions the cause deserved. Something more in the way of organisation must be done if these dinners are to be continued, and if the full measure of success is to be obtained. It may be the price of the ticket; it may be the season of the year, or the day of the week, or insufficient advertisement. Surely we ought to be able to secure an attendance of two or three hundred, at least. On this occasion we numbered fifty, or perhaps sixty. Among those who were present, I noticed Lord Ampthill, as well known in Bedfordshire as in London, Mrs. Burgwin, Mrs. Bowden, Mrs. Gill, Mrs. Barnett, Mrs. Sykes, Mrs. Cresswell, Miss Devonshire, Mrs. Jeffries, Miss Ansell, Miss Carter, the Rev. Allan Rees, Mr. E. Flower, M.P., whose speech was one of the features of the evening, Mr. J. H. Yoxall, M.P., Messrs. Addiscott, Bowden, Macnamara, Gill, Hale, Jackman, Wells, Castell, Sykes, Devonshire, Langler, Adams, Barnes, Stileing, Hill, and Jeffries. On the whole, perhaps, the speeches lacked fire, but the music was certainly of the best. Of course Mrs. Burgwin was eloquent; that goes without saying. During the evening the announcement was made that the Chairman had subscribed fifty guineas to the funds, and had accepted the office of President.

MR. E. GRAY, MP.,
AND
MR. JOHN HILL,
OF THE LONDON DIOCESAN BOARD.

MR. GRAY'S remarkable speech at the Cheltenham Conference of the National Union of Teachers has been so widely read, that we do not propose to give it at length in these columns, or to quote largely from it. Our present purpose is to deal with the reply to that speech by Mr. John Hill, Financial Secretary to the London Diocesan Board of Education, and with Mr. Gray's comments thereon.

First, then, as to

The Sanitary Condition of certain Schools.

Mr. Hill declares that if Mr. Gray's statement, that the children were herded together in buildings unfit for human habitation were true, the Education Department and H.M. Inspectors are much to be blamed for allowing such insanitary conditions to continue. The facts are, that during the past five years the Diocesan Board has spent nearly £10,000 upon the improvement of its school premises, and that in all cases the requirements of the Education Department have been complied with. . . . . St. Paul's School, Canonbury, was closed for a fortnight in February owing to an outbreak of diphtheria in the locality. The whole of the sanitary arrangements of the school had been renewed under the supervision of the local authorities during the previous year, and the sanitary officer certified that no cause of infection was traceable to the school itself.

Mr. Gray, in reply, gives a letter received from Mr. A. E. Harris (Medical Officer for Health, the Vestry, St. Mary's, Islington), dated April 20, 1898. Mr. Harris asserts that the Infants' Department of St. Paul's School, Canonbury, was closed on or about the 15th February for cleansing purposes, in consequence of a notice served by the Vestry to abate a nuisance arising from its dirty condition.

On 22nd February the managers were required to close the same department for three weeks because of an outbreak of measles and diphtheria. It was re-opened on 7th March.

A notice was served by the Vestry, on 23rd February, to have the Boys' Department, which was in a very dirty condition, cleansed. The department was then closed for the purpose of carrying out the Vestry's requirements.

The local managers, to be on the safe side, used the opportunity afforded by the temporary closing of the schools to have the rooms again distempered.

Here is certainly official evidence in support of Mr. Gray's very serious charge. We can only await Mr. Hill's reply.

Secondly, as to

The Payment of the Teachers' Salaries.

Mr. Hill asserts that the assistant teachers have never, to his knowledge, had to wait for their monthly stipends; but he admits that there has been an occasional delay (*of a few days only*) in the payment of the head teachers when the Board's guaranteed credit at the bank happened to be temporarily exhausted, while waiting for the payment of overdue annual Government grants. As head teachers are usually paid quarterly, there has been no real cause for complaint, nor has any been made.

Mr. Gray again gives documentary evidence in the shape of an official note, stating that cheques were enclosed for salaries of assistant teachers and caretaker for month ending 31st October 1897. The official letter is dated 8 *November*. Clearly, therefore, the assistant teachers were kept waiting at least eight days.

A Head Master writes, saying that the teachers have been in a practical state of revolt for the first week in every month for years past, and have sent 'round robins' to Mr. Hill, asking for the punctual payment of their salaries. One of my masters, an elderly man, completely broke down and actually cried. . . . For the past week he had eaten nothing but bread.

An Assistant says his salary is £60 per annum, payable monthly. . . . It has generally been well on in the second week of the month before his salary is paid.

The Lord Bishop of London, on being appealed to by Mr. Gray, promised he would make inquiries on the subject, and would urge that greater punctuality be observed in a matter which seriously concerns the well-being of the teacher.

Mr. Gray goes on to say that, as to head teachers, he knows that the monthly salaries have often been at least sixteen days in arrears, and he quotes a letter from the vicar of one of the parishes concerned. Here is a passage from it: 'The delay in paying the head teachers their stipends up to date has caused us much regret and grief. Strong representations on the hardship have been made to Church House. . . . . We are assured by Mr. Hill that the stipends shall be paid in a day or two. . . . . Rest assured that no effort on our part will be spared to see that the head teachers are duly paid. . . . . Will you kindly communicate contents of this note to Miss ——— and Miss ———.'

Again Mr. Hill has a serious charge to meet. The documentary evidence produced by Mr. Gray makes out a particularly strong case. Mr. Hill may, of course, be able to prove that the evidence is not trustworthy, and that Mr. Gray has been deceived. If so, he will, we imagine, take prompt action.

Thirdly, as to

Quality of Staff and Salaries Paid.

Mr. Hill says there is not a single school which is not staffed considerably in excess of the *increased* requirements of the Education Code, and 'we have, at the present time, a surplus staff in our schools sufficient for an additional average attendance of more than 1,600 children. The teachers are certainly not too well paid; but the average annual salary of our head masters is £140, and of our head mistresses £91, exclusive (in a large number of cases) of free residences and other contingent allowances. These amounts are somewhat less than the average for London Voluntary Schools, but are considerably above the average for the whole country. The assistant teachers are paid in proportion to their experience, qualifications, and status under the Code.'

Mr. Gray replies by quoting from a letter from a head master: 'The staff consists of a majority of Article 68, whose average salary is £30 per annum'; and he goes on to ask how efficient religious and secular instruction can be imparted by a teacher whose qualifications are thus valued, and how a young woman is to maintain herself in London and dress respectably, so as to set a good example to her pupils, on £30 a year?

Mr. Gray apparently passes the £140 and the £91 without comment. Comment is certainly unnecessary. But it is just as well to know that a London headmaster has to live on £140 a year and a head mistress on £91. Those who know the cost of living in London (rent alone is a serious item) will be able to see what these salaries really mean. And then, as to assistants, if Article 68's are really employed to the extent stated in the Head Master's letter, quoted above, one can appreciate the position and responsibility of the head teachers. But here again Mr. Hill has it in his power to give complete details in the shape of actual figures. When these are before us we shall be in a position to discuss the question fully.

Lastly, as to

The Dismissal of Mr. Morgan.

Mr Hill declares that the case of the late head master of St. Paul's School, Canonbury, to which Mr. Gray referred is one for which the Diocesan Board is not responsible.

Mr. Gray answers this by stating that Mr. Morgan received notice of dismissal. On it becoming known that a grant had been awarded to the school under the Voluntary Schools Act, he applied to have his services retained. The School Correspondent (Mr. Gray gives the letter in full) replied that 'after very long and careful consideration the Managers have come to the conclusion that the conditions on which the London Diocesan Board of Education agreed to finance the schools for another year are still existent, and preclude their acceding to the request contained in your letter. The managers once more express their great regret,' etc., etc.

The managers' testimonial was an excellent one.

Mr. Best, one of the managers, resigned his seat, and wrote, under date of 19th of April 1898 (referring to Mr. Morgan's dismissal), 'I am bound to say that it was entirely through the action of the London Diocesan Board of Education in laying it down as a condition of their further financial support that Mr. Morgan should go. His notice was brought to the meeting, and we were told that we must agree to it. As a protest for being a mere puppet in the hands of John Hill, Esq., because he held the purse, I resigned my position as a manager representing the parents.'

Mr. Gray says he has an armful of evidence of similar character. Some of this will probably be made public at the inquiry which we believe is to held as the result of Mr. Gray's repeated demands for an opportunity of publicly stating his case.

It must be remembered that he is a Conservative, that for years he taught in a Church of England School (St. Gabriel's, Pimlico), and that he has always shown a warm interest in the Voluntary School movement.

The attack is not from an enemy of the Church, or of Church schools, unless Mr. Gray, owing to his official connection with the N.U.T., has seriously altered his views within the past year or two.

We refrain from further comment, but we are bound to add that, if ever a case called for public inquiry, this is one.

EDUCATIONAL NOTES.

BY CATHERINE I. DODD,
Mistress of Method, Owens Day Training College, Manchester.

Mr. J. H. Reynolds, Director of the Manchester Municipal Technical School, addressed the Teachers' Guild on March 25th, his subject being 'The Place of Technical Education in our Educational Organization.' He urged that the Technical School clashed neither with the Ordinary School nor with the University. Its function was to take the boy of sixteen and seventeen who had received a good general education, and fit him for the higher posts in industry and commerce. The work of the Technical School is hampered by the inefficient general education of the pupils. Such a pupil should be grounded in mathematics, elementary science, and be familiar with his own language, and one other. Specific instruction had better be left alone. The evening classes are no proper part of the work of a Technical School, but they are of value in meeting the practical needs of those who have begun wage-earning with an inadequate training. Mr. Reynolds illustrated his address by a diagram of the school system of Bavaria. This showed how from a common basis of primary education some pupils left at thirteen and passed into evening continuation schools; others passed into a 'real-schule,' and thence at sixteen into the Technical School; and a third set left for the Latin School, and passed through a classical or scientific course to prepare them for the University. In the discussion which followed, the present state of English education received no flattering treatment from any of the speakers.

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Miss Jane Dickens read a paper before the Child Study Society (Manchester Branch) on 'Children's Characteristics.' She said that the same general characteristics were found in all children, but the wealthier children appear more intelligent and receptive on account of their home advantages; the children of the poorer classes, on the other hand, are more natural, and less imbued with an idea of their own importance. She deplored the fact that the working mother had not the time, and often not the necessary culture, to answer their children's questions. In commenting on the limited nature of the vocabulary of the little ones in an infants' school, she said she once examined a babies' class on the story of Noah's Ark, and on asking for the names of some of the animals which Noah had with him in the ark, the following were the only answers received from a hundred children: 'A bow-wow,' 'two quacks,' 'some chuckies,' and 'a tram.'

She considered want of truthful speaking a serious evil in the primary schools, for which the parents were often accountable; the excuses for lateness and half-day absences often being prompted by the mother. She commended the unselfishness and generosity of primary school children, and their readiness to help each other; and she discussed the influence of the Nature lessons, and children's intense love for living creatures.

She considered that children lacked imagination in inventing games, but they were certainly inventive with regard to toys. They were ready to turn all kinds of useless objects into playthings. She noticed the unwritten law which seems to govern street games all over the country.

In discussing the self-reliance of children in an infant school, Miss Dickens said that they frequently introduced each other as new members without any intervention of the parent, and she told a story of a tall solemn boy of five dragging a fat sturdy mite of three to the teacher's desk with the introduction, 'Please, here's a new scholar—it's my Uncle Sam.'

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Miss Edith Wilson (Owens College) read a paper on April 22nd to the Manchester Child Study Association, on the teaching of children both deaf and blind in the Perkins Institute and Kindergarten for the blind in Boston, Massachusetts. She said that a generation ago Laura Bridgeman was taught at this institution by Dr. Home. The present director, Mr. Anagnos, is his son-in-law, and, under his guidance, Froebel's principles have been adapted to every part of the school work. Five pupils, who are deaf as well as blind, have been received during recent years. Helen Keller, who has become famous, has developed unusual ability of a literary and imaginative kind, and is now studying for admission to Radcliffe College; her course includes several languages and mathematics. Edith Thomas, who has become an active, dependable, and thoughtful girl. Elizabeth Robin who has passed through the Kindergarten and is now in the upper school. Thomas Stringer, now about eleven years of age, and is developing remarkable mechanical power; he has gone through a Sloyd course with more success than 'seeing' boys, his only special tools being a measure with raised figures and an awl instead of a pencil. Of the fifth there is little to tell at present. All these children have been taught first to spell on their fingers the names of objects that could be put into their hands. Each has had a special teacher, and with her as interpreter follows the class work as arranged for the blind. They are also taught to articulate, and to read on their fingers from the lips of others, but the manual alphabet remains their usual means of communication.

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Miss Wilson's account of the methods employed in the Perkins institution recall Mark Twain's educational views in his recent book. He prefaces a chapter on Education with the trenchant remark from the mythical Pudd'nhead Wilson's New Calendar, 'In the first place God made idiots. This was for practice. Then he made School Boards.'

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He says that the methods used in deaf and blind schools are rational, and instances Helen Keller, who was dumb, stone deaf, and stone blind from babyhood. She has been taught with such success that at sixteen she writes essays on Shakesperean characters in fine strong English, and she passes the Havard University examination in Latin, History, *belles lettres*, and so on. This is accomplished, says Mark Twain, because the teacher

> 'exactly measures the child's capacity to begin with, and from thence onward the tasks are nicely guaged to the gradual development of that capacity.'

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He compares this with the public school methods of America:

> 'In the public school, apparently, they teach the child to spell cat, then ask it to calculate an eclipse; when it can read words of two syllables, they require it to explain the circulation of the blood; when it reaches the head of the infant class they bully it with conundrums that cover the domain of universal knowledge.'

He admits that—

> 'this sounds extravagant, yet it goes no great way beyond the facts.'

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We are sometimes capable of these unnatural cruelties in our Infant Schools. We will not believe that the child's mind is simple and we must present to it simple things in a simple fashion. It is not uncommon even now to find such subjects as the Mariner's Compass, Coal, a Coal Mine, the Formation of Dew, among the object lessons of an Infant School, and children of six are still required to work out columns of figures and produce answers which deal with numbers beyond their comprehension. We are not content with simple numbers and simple familiar things. We hasten to rush the child beyond his environment before he is fairly in it. Mark Twain's criticism 'sounds extravagant,' as he says, but it contains a truth, as do most of his sayings.

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A meeting of University Extension Students will be held in London early in June. The central idea throughout the lectures will be London, its History and Geography, its Literature and Art. All particulars can be obtained from the University Extension Office, Charterhouse, London.

Full particulars of Educational Holiday Courses will appear in the July Holiday Number.

EDUCATION IN SCOTLAND.

E.I.S. NOTES, &c.

BY JAS. PATERSON,
Vice-President of the Educational Institute of Scotland.

Edinburgh Branch E.I.S. At the April meeting of the Edinburgh branch of the E.I.S. a triple bill of fare was presented. The first paper was by Mr. A. C. Tait, Warrender

MR. J. GRAY THOMSON.

Park School, his subject being 'Evening School Education.' Mr. Tait at the outset mentioned that from 1893 to 1896 the average attendance at evening schools in Scotland had increased from 19,000 to 50,000. Three things, he said, were essential to the success of evening school work. The session must be of sufficient length to give reasonable hope that the work would be of some permanent value. Many Boards found it expedient to close the schools as soon as the grants reached the 17s. 6d. limit, which could be done in forty meetings of two hours each. Attendance should be regular and continuous; and he also recommended the remission of fees, as in Edinburgh, in all cases in which the attendance reached a fixed percentage of the possible. Four years' experience has convinced Mr. Tait of the superiority of the method of inspection by 'visits without notice' over that of the annual examination.

The subject of 'Extended School Board Areas' was dealt with by Mr. E. A. White, Roslin, who spoke in favour of County School Boards, maintaining that their adoption would result in the better grading of schools in a district, prevent overlapping, improve the *personnel* of the boards, give teachers a better security of tenure, and introduce a more equable system of rating.

The claims of the Institute were afterwards advocated by the present writer, who appealed to his hearers to do all in their power to increase its membership, its influence being in direct proportion to its numbers.

Epidemics in Schools. Sir Henry Craik states that Article 19F applies only to cases where the attendance has been seriously diminished, and any application for a special grant must be lodged with the Department within seven days of the date on which the children have been excluded from school, and must be accompanied by the usual notice or medical certificate. When a grant is applied for in consequence of a sanitary authority having closed a school, or excluded children from it, the Department will require the production of the written notice of the sanitary authority. Further, if a School Board applies for a grant in consequence of any Act of Parliament requiring the exclusion of certain children from a school, the Department will require a medical certificate in regard to the condition of the children. In reply to a question as to the precise meaning of 'seriously diminished attendance,' the Department has made the important announcement that at least 5 per cent. of the children must be absent owing to the epidemic.

Infectious Diseases. It should be known by teachers that, under the 57th section of the Public Health Act, teachers who knowingly permit attendance at a school of children who have been suffering from infectious disease, or who have resided in a house where such disease existed, are liable to a penalty not exceeding forty shillings, unless such children produce a certificate from the medical officer, which he shall grant, free of charge, or from some legally-qualified practititioner, that such child has become free from disease and infection. The Local Government Board has given the opinion that measles and whooping-cough come under the above section.

West of Scotland Association of Secondary Teachers in Public Schools. At a meeting held in Glasgow recently the 'West of Scotland Association of Secondary Teachers in Public Schools' was formed, its constitution and rules adopted, and members enrolled. Mr. James Henderson, M.A., Headmaster Whitehall Public School, Glasgow, was called to the chair, and, in the course of his remarks, pointed out that the object of the association was to promote secondary education in public schools, and to discuss subjects bearing thereon; that it was to be in no way antagonistic to the interests of the Educational Institute of Scotland, but, on the contrary, its promoters were anxious that the work of the new association should receive its support. At the same time there were matters in connection with secondary education which were of immediate interest only to those engaged in the work. Office-bearers were elected, Dr. Dickie, Kilmarnock Academy, being made the first president of the association.

The late Dr. Morrison. Education in Scotland has suffered a great loss in the death of Dr. Thomas Morrison, Rector of the Free Church Training College, Glasgow. Dr. Morrison has been in failing health for some years, but he had been laid aside from active duty for only a few weeks. For forty-seven years he had held the position of rector, and the thousands of students who passed through his hands, and who are to be found in all parts of the world, will long cherish his memory. In educational questions Dr. Morrison took a keen interest. He filled the office of President of the Educational Institute of Scotland for the usual term, and for a long num-

THE LATE DR. MORRISON.

ber of years he was Secretary to the Board of Examiners. He was the author of numerous educational text-books, and in recognition of his services in the cause of education he received, some twenty years ago, from his *Alma Mater* the degree of LL.D.

Article 17 (h). Sir Henry Craik, in reply to a representation from the Greenock School Board, has cleared up to a large extent the meaning of the 'record of work done' required under Article 17 (*h*) of the Code of 1898. Sir Henry says that what is desired is:—(1) A record of the lessons given, and the work on which the class, as a whole, has been engaged, for each *class* (not for each pupil) during a given period. It will probably be desirable, he says, to have the record posted up at least once a week. (2) The papers worked and the statement of results at each quarterly (or monthly) examination should be preserved for the inspector's information. (3) The written exercises and drawing copies of the children of the higher standards at least should be similarly preserved for inspection. (4) When the work consists merely in a revision of previous lessons it should be so stated.

Board School Education. The chief business at the May meeting of the Edinburgh branch of the E.I.S. was a paper by Mrs. Kerr, a member of the Edinburgh School Board, on 'Board School Education.' In the course of an excellent address, Mrs. Kerr said that, considering the early age at which many children are withdrawn from school, all that can be hoped for regarding them is to lay effectively the foundation of education. A great object would be gained if, during the all too short period of school life, the children could be taught to think for themselves, and to exercise their mental powers so as to be trained to habits of self-culture, and to leave school with a desire for further knowledge and a determination to acquire it. Mrs. Kerr afterwards dealt with some of the subjects of the curriculum, and, in regard to history especially, laid stress on the need of making the library an adjunct to the classroom.

Attendance of Children at School. The recent meeting of representatives of the principal School Boards of Scotland on the question of the early age at which children leave school, and the resolution adopted thereat, are likely to bear fruit even sooner than the most sanguine anticipated. A bill, bearing the name of Lord Balfour of Burleigh, entitled 'An Act to further amend the law of Scotland with respect to the attendance of children at school' has been issued. An accompanying memorandum explains the circumstances under which the bill is considered necessary. It gives power to School Boards, with the sanction of the Department, to raise the standard of exemption by means of bye-laws, as they may feel that the circumstances of the locality demand.

The President Nominate of the E.I.S. Mr. John Gray Thomson, F.E.I.S., Head Master of John Neilson's Institution, Paisley, is the President-nominate of the Educational Institute of Scotland for the year 1898–99. Mr. Thomson is well known and highly respected by the teaching profession in Scotland. In his own branch of the Institute he has taken a large share of the work, and he has likewise served on almost all the committees of the general body. The Educational Institute has done itself credit in selecting for its highest honour a gentleman of the high character and reputation of Mr. Thomson, and it may safely be predicted that his term of office will be popular and successful.

'Drawing under the Education Department' is the title of an important contribution which appears in 'The Practical Teacher's Art Monthly' for June, by T. G. Rooper, Esq., H.M. Inspector of Schools. This is followed by a most complete Scheme of Drawing and Manual Instruction, specially drawn up by J. Vaughan, Art Master, School Board for London.

EDUCATION ABROAD.

BY E. E. FOURNIER D'ALBE, B.SC., A.R.C.S.

IN the *Revue Pédagogique*, L.C. Bon gives an interesting summary of Fricke's book on the legal aspect of personal chastisement in German schools. In France it is absolutely forbidden to inflict any corporal punishment whatever. In the United Kingdom and in Germany, and in the majority of other European countries, corporal punishment is allowed. In Germany it is limited by certain rules, and the diversity of these rules in the various German states is the subject of some amusing comparisons. In Hessen the law forbids blows on the head, the face, the back, and the hands, leaving the rest of the body exposed to the attacks of the enemy. In Lower Bavaria the law of 1815 (still in force) says that light faults may be immediately corrected by the teacher, but in the case of graver delinquencies, the local inspector, usually the clergyman, has to pronounce the sentence, which is then executed by the hall porter in the Inspector's presence. The construction, thickness, and length of the rod is subject to minute regulations in various districts; also the number of strokes. Cases of excessive punishment are frequently brought before the law courts by indignant parents. The lower courts usually acquit the teacher; but the Central Imperial Court of Leipzig, when appealed to, has often been known to be very severe on him.

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NEEDLESS to say, the pupils of the schools have all kinds of devices for avoiding the unpleasant consequences of insubordination. I well remember from my German schooldays a boy who had invented a particular combination of flannel and cardboard which not only warded off the blows effectually, but deceived the inflictor as to the presence of these "masked" defences. Unfortunately, the failure of even a vigorous administration to produce any visible effect upon the delinquent led to their premature location. There was one peculiar combination of Latin grammar and school poetry which should be rescued from oblivion. It was a Latin-German doggerel which ran as follows:—

Hic, haec, hoc
Der Lehrer kömmt mi'm Stock
Is, ea, id
Was thut er denn damit?
Ille, illa, illud
Er häut den Jung' kaputt.

The last words may puzzle some of our German scholars. "kaputt" is a word very commonly used for "entzwei," but it is not found in the dictionaries. The verse served the double purpose of recalling the demonstrative pronouns and the majesty and terror of the teacher's discretionary power. A stick was not, however, very largely used. The palm of the hand, descending with considerable velocity upon the cheek of the offender, served all the purposes of more elaborate weapons. One teacher inflicted a refined kind of torture by pulling hard at the stray hairs which hang down just in front of the ear.

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M. BON triumphantly compares the French with the German system. Although slow to conquer, the triumph of the principle of non-corporal punishment is definitely assured in France. Inspired by Rabelais, Montaigne, Fénélon, and Rousseau, French pedagogy maintains that school discipline must be founded upon the moral authority of the teacher, and not upon the fear of physical pain. 'The aberrations of the will, of the heart and soul, cannot be corrected by blows which only reach the body.' Now this is all very well theoretically. But practical teachers will agree that if a fault can be immediately followed by a corresponding punishment, an important educational aim is attained. The great advantage of corporal punishment lies in its immediate effectiveness. What the nature of the punishment is seems to be immaterial. It need only be some outward and tangible sign of the teacher's displeasure. Most children feel the displeasure of the teacher more acutely than the actual punishment. The same number of blows, exchanged with a schoolfellow in friendly combat, might even be a source of keen enjoyment. On the other hand, a douche of cold water, if reserved for the purpose, might come to be regarded as an extremely severe and painful mode of punishment. In ultimate analysis, all punishment is moral punishment. The manner in which displeasure is brought home to the offender is a matter of secondary importance.

OUR CLASS ROOM AIDS

NOTES OF A LESSON ON CORK.

BY WILLIAM DONE, B.A.

Head Master of Brighton Pupil Teacher School.

SEE SUPPLEMENT PRESENTED WITH THIS NUMBER.

Articles of Illustration—The diagram accompanying this number of the PRACTICAL TEACHER, some corks, a piece of virgin cork, bowl of water and small blocks of wood.

HEADS.	MATTER AND METHOD.
I. *Chief properties of Cork.* (*a*) Lightness.	Let the children estimate the comparative lightness of cork by taking somewhat nearly equal volumes of cork and wood. Float in the basin of water some cork and wood. Observe also in the diagram where exactly equal volumes of these two substances are compared. Cork is nearly the lightest vegetable substance we know.
(*b*) Compressibility.	Pass some corks round the class. Draw out that they can squeeze the substance into smaller bulk. Refer to corks being squeezed into the necks of bottles. Cork is therefore easily compressible.
(*c*) Elasticity.	A cork having been forced into a bottle by compression, will immediately regain its former shape if released, hence we see that it is elastic.
(*d*) Waterproof.	Though we notice so many small holes in the cork, yet water will not readily pass through, because the pores do not run into one another.
II. *What cork is.*	Show the piece of virgin cork. From examination of this and the diagram the children will at once judge that cork is the bark of a tree. Yet they will notice that there is a great deal of difference as regards colour, softness, and elasticity between the virgin cork and that used for ordinary purposes. One is the first bark which the Cork Oak bears, the other may be the second or third. The Cork Oak grows in Spain, Portugal, Italy, and generally in Southern Europe and Northern Africa. It is very different in appearance from our oak tree, though about the same height. Its leaves are evergreen, oval in shape, and notched round the margin, but not deeply cut. They are not large, not much longer than our beech leaves, and slightly hairy underneath. The remarkable feature of the tree is its thick outer bark. This, if left to itself, will crack and peel off in course of time. Compare the peeling of the epidermis of the common plane tree. When the first outer bark is detached from the cork tree a new one forms—the second bark. This is finer in texture and better in quality altogether. A third outer bark obtained in this way would be better still. We must be very careful not to confuse the outer with the inner bark. The children who know anything of botany will be aware that the inner bark is essential to the life of the plant. The shedding of this outer layer benefits the tree, as in towns the peeling of the outer bark of the plane tree causes it to withstand the deleterious effects of a smoky atmosphere.
III. *How the bark is obtained.*	The cork tree is allowed to come to maturity before the first outer bark is stripped off. This takes place when it is about twenty years old. We see in the diagram a tree which has been stripped, and one in which the process is in operation. A cut is made round the tree just above the roots, and similar cuts through the outer bark parallel to this at intervals of two or three feet, the last cut being just below where the tree begins to branch. Then cuts are made down the tree in the other direction, so as to portion out the bark into oblong spaces. We observe one workman loosening a sheet from the tree with a kind of lever, while his comrade is making the groove. After an interval of eight or nine years the second outer bark is similarly removed, and henceforth at such intervals the bark is regularly stripped during the lifetime of the tree which may endure for nearly two centuries.
IV. *Preparation for Commerce.*	The first bark, called virgin cork, is generally used in this country for ornamental garden purposes, such as artificial rockeries, etc. The better layers are first flattened out by pressure or heat, and slightly charred outside to partially close up the pores. Generally speaking they are further cleansed by boiling in water and scraping, and then dried again in the sun. Corks are cut either by hand or by a machine. The bottle corks are so cut that their length is against the grain. Compare the greater elasticity thus obtained with large bungs or fishermen's floats which are cut the other way. We see the cutter's knife in the diagram. It is depicted about the right size. By a clever cut a circular strip is cut from the sheet of cork whose diameter varies with the thickness of the sheet. The corks are then cut into the the sizes required.
V. *Some of the uses of cork.*	Question out some of the further uses of cork besides serving as stoppers for bottles or casks, though the quantity used for this purpose is enormous. The picture of the lifeboat man shows us the buoyant character of cork and its great utility in the water. Cork floats are used by fishermen for their nets, and for the fishing-lines of anglers. Think also of cork soles for shoes, mats and floor-coverings. For all these its lightness, elasticity, and waterproof qualities admirably fit it. In countries where it is common, it is used for many other purposes, roofing houses, making pails, stuffing mattresses, horse collars, etc.

Mr. S. Bearder, Instructor in Hand and Eye Training to the Leeds School Board, has just begun in 'The Practical Teacher's Art Monthly' a series of illustrated contributions on CARDBOARD MODELLING.

NOTES OF LESSONS.

I.—THE FROG.

BY WILLIAM DONE, B.A.,
Head Master, Brighton Pupil Teacher School.

Articles of Illustration.—Two or three young frogs which are plentiful at this time of year, some tadpoles, if not too late, a picture of the skeleton of the frog (*Royal Portfolio Series, T. Nelson & Sons*), a large basin of water.

Heads.	Matter and Method.
I. *Its general shape and appearance.*	Show a frog. Notice the length of the hind legs as compared with the fore legs. The head is large for the size of the body and broadly triangular in shape. From the picture of the skeleton we see the frog has no ribs. There are five toes on the hind feet and four on the front ones. The skin is brownish green and feels cold and clammy. The eyes are large and prominent.
II. *Its movements.*	Demonstrate the jumping movement of the frog, and compare with the kangaroo, etc. The long hind legs are favourable to this leaping mode of progression, and also the absence of ribs. From the specimens examined by the class, note that the hind feet are webbed but not the fore feet. Place the animal in a basin of water and observe its swimming powers. The use of the webbed feet in offering more resistance to the water will be made clear. Compare with the feet of the duck, etc., and recall the fact that in swimming we place the fingers of the hand together. The frog then is adapted to live on land and in the water. It is a cold-blooded animal, that is, its blood takes the temperature of its surroundings; this fact also aids it in remaining a long time in water if necessary.
III. *How it captures its prey.*	The large mouth of the frog is very noticeable. But its great peculiarity is the tongue. This is fastened to the front of the mouth, not to the back, as in man. The tip, which is double pointed, is directed towards the throat. The frog eats worms, snails, etc., but likes especially flies and other small winged insects. When one of these comes within reach, the tongue, which is sticky, is rapidly darted out, and as quickly drawn back with the fly sticking on the tip. Worms and snails are pushed into the mouth with the fore feet. The upper jaw has a row of teeth, but there are none in the lower jaw. Another peculiarity is that the frog does not drink by means of its mouth, but absorbs moisture through its skin.
IV. *How it breathes.*	We noticed that the frog has no ribs. Call attention to the important part the ribs play in our breathing. Now observe our frog as he sits quietly. He seems to be constantly swallowing, and the loose skin just under the mouth alternately swells up and then decreases in size. The mouth is tightly shut. Point out the very small nasal apertures. When the mouth is shut, the air enters the nostrils, and having filled the mouth cavity, the animal swallows the air and so forces it into the lungs. Breathing also takes place through the porous skin.
V. *Winter quarters.*	Country children will know that frogs have only recently come out from their hiding-places. Some of them look very thin. During the winter they generally rest in the mud at the bottom of ponds, or in some damp hole in the ground. They wake up again about March. The little sustenance they require during their dormant period is taken from their own tissues.
VI. *The life history.*	The tadpole stage of existence should be taken in another lesson.

II.—FLAME OF A CANDLE.

Articles of Illustration.—Specimens of candles, and of candle-wicks, a piece of narrow glass-tubing, a glass jar, a piece of wood charcoal.

Heads.	Matter and Method.
I. *General appearance of a candle flame.*	Have sufficient candles for small groups of the children to observe the flame very carefully. As the various parts are noticed, draw the diagram on the blackboard. Call attention to the little pool of melted wax, the wick, and the flame. The yellow mantle is the brilliant part. Inside this is a dark cone, and there is a faint blue mantle layer at the bottom, extending up the sides. So we see the candle flame has three parts, a large yellow luminous zone, an inner dark zone, and an outer zone dimly luminous at the bottom.
II. *The wick.*	Take a piece of unused candle-wick and dip one end in some ink. Notice how the ink creeps up the threads. We say this takes place by capillary attraction. Place some pieces of glass-tubing in coloured water to further illustrate. When the heat of the lighted wick has melted a little pool of wax, the melted material creeps up the wick to be turned into lighted vapour.
III. *The inner dark zone.*	Carefully insert the end of a narrow piece of glass-tubing in the dark zone of a steady flame. Place a light to the other end of the tube. The issuing gas will produce a flame. Clearly then the dark part of the candle flame consists of a zone of unburnt gas.
IV. *The bright yellow mantle.*	We can easily demonstrate that the yellow mantle is hot and will deposit soot if we hold anything cold in it for a moment, such as a piece of cardboard. The soot is composed of particles of a substance called carbon, which enters into the composition of the wax of the candle. The heat of the flame makes these particles of carbon glow brightly. Illustrate further by igniting a piece of wood charcoal in a good current of air.
V. *The faint blue outer zone.*	We can demonstrate as before, that the faint blue outer zone will deposit no soot. It is also the hottest part of the flame.
VI. *Summary of the three zones.*	To collect the information we have gathered, we note,—first the innermost dark zone is a mass of candle gas, being the vapour form of the melted wax. This surrounds the wick. It does not burn because the outside air cannot get to it. The next zone, the bright yellow one, is some of the candle gas in contact with air. It is a hot flame, and bright owing to the carbon of the candle gas becoming incandescent. The outermost ring consists of plenty of air and only a little candle gas. Here combustion is complete, the flame is pale, and the heat greatest.

☞ ***A full page of specially prepared, White on Black, Blackboard Illustrations, by C. Armstrong, City of London School of Art, and Examiner to Science and Art Department, to suit the above Object Lessons, appears in the June Number of the PRACTICAL TEACHER'S ART MONTHLY. Now ready, Price Twopence.***

HOW TO TEACH MAGNETISM AND ELECTRICITY AS A 'SPECIFIC SUBJECT.'

BY B. ELDERKIN.

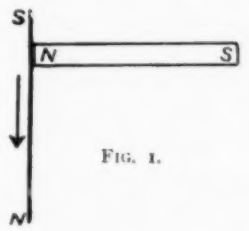
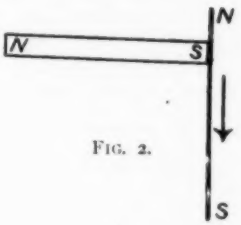
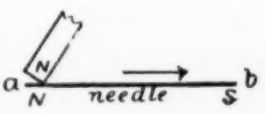
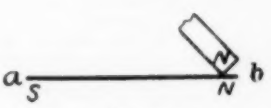
Model School, Westminster Training College.

FIRST YEAR'S COURSE.

MAGNETISM—Lesson 5.

HOW TO MAKE MAGNETS.

Apparatus.—Magnets, knitting needles, some lengths of crinoline steel, magnetic needle, small sheet of glass or cardboard, iron filings. N.B.—In all experiments requiring non-magnetised steel TEST the steel with the magnetic needle before experimenting. Needles, &c. are frequently magnetic and consequently the experiment will be vitiated.

Heads.	Matter to be taught.	Method of Teaching.	Illustrative Diagrams.
I. Method of single touch.	1. A piece of steel if drawn across either pole of a magnet becomes itself a magnet. The polarity of the steel is always such that the end where you cease rubbing is opposite in kind to the pole of the magnet used. 2. The same effect is produced if the steel be laid on the table and the magnet drawn along it from end to end.	1. (*a*) Show that both ends of an unmagnetised knitting needle attract both ends of the magnetic needle. (*b*) Draw the same needle across the north end of bar or horseshoe magnet (Fig. 1). (*c*) Dip both ends of the knitting needle in iron filings after rubbing to show magnetism. (*d*) The end you leave off at will attract N. pole of magnetic needle and repel S. pole. (*e*) If the experiment be repeated on the S. pole of the magnet the effects are similar, but the polarity is reversed (Fig. 2). 2. Use the crinoline steel. Figs. 3, 4, 5, 6 show variations of the experiment. Always test for polarity and mark poles.	 FIG. 1.  FIG. 2.
II. Modes of rubbing.	1. The magnetisation is increased by rubbing several times when the rubbing is always in the same direction. 2. The rubbing must not be backwards and forwards. The effects of this is that the polarity is reversed and the magnetisation lessened. The steel offers resistance to magnetisation, and this is not overcome by simply rubbing once. In reversing the rub the magnet has to overcome the previous magnetisation as well as to magnetise the opposite way.	1. (*a*) Rub spring or needle once and dip in iron filings. (*b*) Next rub a similar spring the same way several times. Number of times to be counted. Then dip in iron filings and contrast with (*a*). 2. (*a*) Rub a needle from *a* to *b* with N. pole, *b* will be a S. pole and *a* N. (Test as before with magnetising needle.) (*b*) Now draw the magnet back from *b* to *a* on the same needle and test polarity. It will be reversed (Fig. 7).	  FIG. 7.

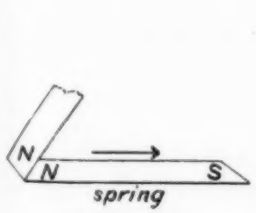


FIG. 3.

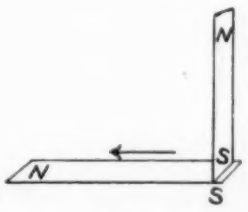


FIG. 4.

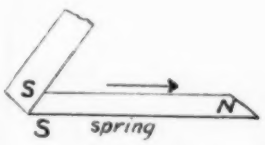


FIG. 5.

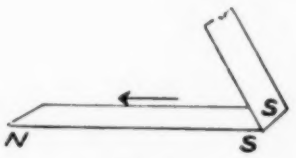
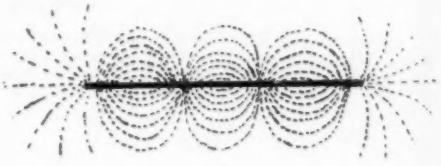
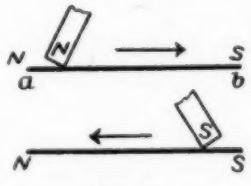
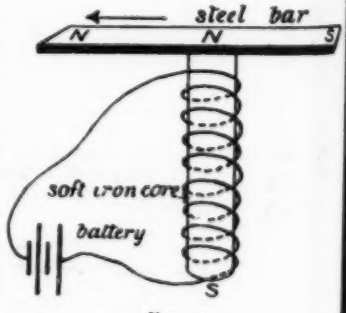


FIG. 6.

MAGNETISM—Lesson 5.—(*continued.*)

Heads.	Matter to be taught.	Methods of Teaching.	Illustrative Diagrams.
II. Modes of rubbing—*cont.*	3. The magnet must be carried back to the starting end at a distance from the steel to be magnetised. 4. The magnet should be drawn slowly and evenly, with no stops or jerks. The effect of these is to create *consequent poles or points* where the stoppages occur. A magnet magnetised in this way is not so powerful.	3. (*a*) Lay needle on table. (*b*) Draw a magnet from one end to the other, *near* but *not* touching the steel. (*c*) Test it with magnetic needle. It has become magnetic. (*d*) If you *rub* one one way and return to the starting end close to the steel the effect is similar to rubbing backwards and forwards. 4. Take a spring and rub from *a* to *b heavily* but in a jerky way, stopping at several points 1, 2, etc. (Fig. 8). Now lay glass or cardboard over the spring, sprinkle with iron filings; tap the glass or cardboard gently and the filings will arrange themselves in clusters at the points of stoppage (Fig. 9).	 FIG. 8.  FIG. 9.
III. Method of divided touch.	1. The magnetisation may be effected with two magnets at once, if you start rubbing from the centre with unlike poles and rub outwards. The same rules for rubbing apply as in the method of single touch.	1. (*a*) Let scholars state effect of rubbing from *a* to *b* with N. pole. (*b*) They can also tell which way to rub with S. pole to produce same effect, viz., *b* to *a* (Fig. 10). (*c*) Therefore to use the two together, the magnets must be rubbed in *opposite* directions and with opposite poles. (*d*) This can only be done by starting to rub at the centre and rubbing outwards. (*e*) A more perfect method is shown in Fig. 12.	 FIG. 10. FIG. 11. FIG. 12.
IV. How strong magnets are made.	1. The above methods make useful magnets for experimental purposes, but the strong permanent magnets are all made from electro magnets.	1. These will be fully explained at a later stage. They cannot now be shown experimentally. A coil of wire is wound round a soft iron bar and a current of electricity sent through it. The bar becomes a powerful magnet. The steel bar is then drawn across one pole in accordance with the above rules and experiments (Fig. 13).	 FIG. 13.

Every Pupil Teacher should read the illustrated contributions on Freehand by Mr. Hastwell, Art Master, London School Board, now appearing in 'The Practical Teacher's Art Monthly.'

THE PRINCIPLES AND PRACTICE OF CLASS TEACHING.

V.—PROBLEMS.

THUS far we have spoken of rules or methods of dealing with numbers, **without taking into account what these numbers represent.** The only reference to concrete things was in the introductory stages, in learning to count, in dealing with the grouping and analysis of simple numbers, and in illustrating the simple processes of addition and subtraction. The branch of arithmetic which is concerned with the relations of abstract numbers in this way is sometimes called **Pure Arithmetic,** while **Applied Arithmetic** deals with the application of these rules and relations to concrete things.

In some arithmetical text-books the plan is followed of proceeding with pure arithmetic, passing from the four simple rules to vulgar and decimal fractions. But for common school purposes this would be a mistake. And it would be no less a mistake to confine the teaching to pure arithmetic during the study of the simple rules. At every stage of progress the rules of addition, subtraction, multiplication, and division should be used in the **solution of problems dealing with actual things.** It is of course necessary to teach, and for some time to practise, the rule on slates in the abstract way; but as soon as the mechanical difficulty of manipulating the figures has been somewhat mastered, the elementary 'problem' of a suitable type must be introduced. Even before this can be done on slates it can and should be done mentally. For while a great deal of mental arithmetic in the early stages must be mere drill in numbers—and the more rapid and automatic the processes become the better—yet some time should always be given to the solving of short mental problems.

> Short they should always be. Many teachers waste time by giving problems with too long explanations and too many processes, so that many of the class cannot remember them all. Then the question must all be repeated, confusing those who have already begun to solve it; and at the close it is often impossible to say whether the fewness of the answers is due to want of knowing the rules and how to manipulate figures mentally, or to getting confused in the conditions and terms of the problem.

Want of practice in applying the rules makes the learning of the rules **practically useless.** Multiplying or subtracting comes to be regarded as an operation which may be performed with figures on a slate, but which has little connection with the world of real things. So when a simple calculation regarding real things is given, the pupil is actually at a loss sometimes whether he should multiply or divide! This difficulty is by no means uncommon, and its commonness may prevent our noticing its real significance. Its presence really stamps the whole of the arithmetical teaching received as practically valueless. We are teaching the boy expertness in handling tools of whose real use he remains ignorant; or at least we are teaching him so that the handling of the tools and the circumstances under which they should be used do not suggest each another to his mind. It often happens, too, that if a child is asked to solve a problem where the numbers are somewhat large, he is at a loss how to begin, while the same problem given with small numbers will be solved mentally with the utmost ease. This indicates the same weakness in teaching—that it has been confined too much to pure arithmetic, and that the practical applications have been neglected.

> The only cure for this is abundance of problems introducing the rules already mastered. And in setting such problems, the teacher should always construct them with some regard to the facts of real life. The conditions specified should not be obviously impossible or improbable, and the answer should be such as one would *expect* from the experience of life. This caution will need to be kept specially in mind, in dealing with prices of goods, at a more advanced stage. For example, the teacher should not set problems, even for mere practice, where the answer would require the price of an ounce of tea to be several shillings, or that of a hundredweight of sugar a few pence. And on the other hand, the pupil should be cautioned against resting satisfied with an answer that is evidently and grossly at variance with common sense.

REDUCTION.

After some practice in the four simple or fundamental rules of arithmetic, it is our general habit to proceed to the application of these rules to sums of money and other concrete things. **This application we call the Compound Rules.** A necessary preliminary is the power of changing a quantity from one denomination to another, which corresponds to 'carrying' in the simple rules. At this point, then, arithmetical teaching *must* take the form of applied arithmetic, but it is very unwise to postpone such teaching till this point is reached.

The great difficulty which beginners find in any given case of reduction is to know whether they should multiply or divide. Had the **practical use** of these two processes been as well attended to as the mere manipulation, such a doubt could never arise in the pupil's mind. The common rule given—to multiply when a lower denomination is wanted, and divide when a higher is wanted—is merely a short 'rule of thumb' to supply this deficiency.

Our common tables of money, and measures of weight and of distance, with all their venerable irregularities and inconveniences, make the teaching of reduction a matter of considerable time, if not of great difficulty. **These tables should never be merely learned by rote,** but the ideas of the various weights and measures should be made clear and useful by the actual seeing and handling of the various units—ounce, pound, foot, yard, etc. Familiarity with these will do much to prevent absurd answers from being given in reduction and the compound rules.

> It may be worth noting that certain tables, such as our Time table, do not give a scale of numbers which can be used in the ordinary way in reduction. A certain number of years, for example, cannot be reduced to days by bringing them successively to months, weeks, and days. The reduction can only be performed by multiplying by 365, and then only approximately, owing to the fact that certain of these years have 366 days. But to multiply by 12, 4, and 7 is obviously useless. In measures of length, again, we have really several parallel and distinct tables to teach—miles, furlongs, poles, yards; miles, furlongs, yards; miles, furlongs, chains yards; or miles and yards simply. Such different forms of table should be studied and practised both separately and in relation to each other.
>
> Many errors will be avoided by attending to one simple precaution, and that is requiring the pupils to write after each step in their reduction the *name of the unit* to which they have reduced the original quantity. In reducing tons to ounces, for example, the successive products obtained should have 'cwts.,' 'lbs.,' 'oz.,' or the like, written after them. This will both suggest the next multiplier, and remind the pupil of the proper place at which to add in any cwts., lbs., or oz. which may be given along with the tons to be reduced. A similar plan should be adopted in ascending reduction.

NEEDLEWORK FOR PRACTICAL TEACHERS.

By the Author of 'Blackie's Manual of Needlework.'

WHILE THESE NOTES ARE WRITTEN SPECIALLY TO MEET THE REQUIREMENTS OF CERTIFICATE CANDIDATES, THEY WILL BE FOUND USEFUL BY **ALL TEACHERS** WHO HAVE TO PREPARE FOR EXAMINATION IN THIS SUBJECT.

SECOND YEAR STUDENTS.

Cross Cuts.

The details of the darning of cross cuts may be found in any good sewing manual; the remarks I am to make are only meant to emphasize certain points which seem to escape from students' memories when they work them.

(*a*) *Materials.*—The best material for practising these cuts on after canvas (at least for examination purposes) is Saxony cloth or coarse linen. Fine, flourishing, or better, flax thread, with a straw needle, or No. 6 long one, should be used with this. But even with these comparatively coarse materials (a great advance on the fine shirt-fronting linen on which students' darning used to be done), you will do well to remember that too much practice *must injure* the eyesight.

(*b*) *Size of Stitch.*—Over two threads and under two threads, with two threads of the material *between each row*, is what is wanted.

Students need not add to the difficulty of the exercise by lifting only one thread and passing over one. When darning tablecloths, take up a small piece of the material, and pass over the same length.

(*c*) *Right* and *Wrong* sides.—Darn on the *wrong* side of the material. Keep the raw edges of the cut to the same side, and try to avoid fraying them out by keeping the thumb firmly on them while the thread is being drawn through.

(*d*) *Loops.*—Always leave loops to allow for shrinking, but do not make them too long. From $\frac{1}{16}$ to $\frac{1}{8}$ of an inch is quite sufficient.

(*e*) Cut on the *diagonal* of a square. Remember that, though a cut on a tablecloth may be at any angle (and, therefore, for practical purposes should be practised in various positions), for specimens the cut is made exactly on the bias or diagonal.

The cut must also be *parallel to the bases of the two triangles* by which it is enclosed. Fig. 1 shows the right position of the cut. Fig. 2 is wrong.

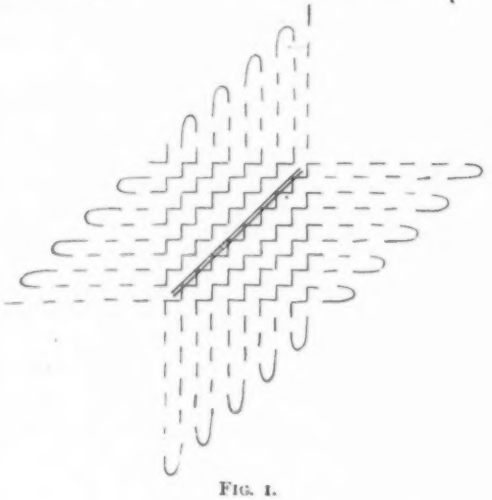


FIG. 1.

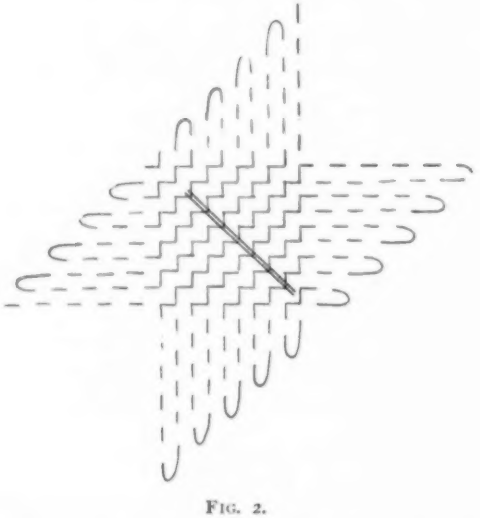


FIG. 2.

(*f*) *How to plan the shape of the darn.*—Fig. 1 shows that the cut has to be enclosed in two rhomboids, or, from another point of view, two triangles.

This may be done :—

(*a*) *By pencilling the outline.*—I see no reason why this method should not be followed, provided the pencilling be done with a crayon of the same colour as the thread used, but some examiners condemn it.

(*b*) By creasing two folds—a *horizontal* one *above* the cut, and a perpendicular one at *right angles to the former*, either at the right hand or at the left.

The second crease depends on *the direction the cut takes*; right to left, or left to right. Figs. 3 and 4 will show you what is meant.

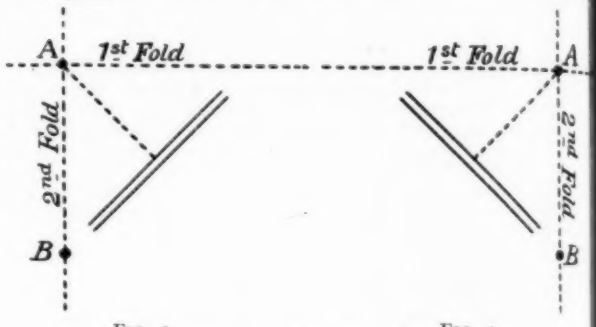


FIG. 3. FIG. 4.

(*c*) *Darning.*—You may darn either by two triangles or by two rhomboids, but the latter is the easier way. The letter A is the apex of the triangle of which the cut is the base. Darn the *selvedge* way first.

First Rhomboid.—Commence at A. Stop when you reach B, and count the number of stitches on the needle, and take exactly the same number beneath B. If there are nine stitches from A to B, eighteen will be the length of the rhomboid.

The *second* row will commence two threads to the *right or left* of the first row, as the slant must go in the direction of the cut (see Fig. 1).

Second Rhomboid.—Begin the second where you commenced the first at A, and be careful that the stitches show through *clearly to the right side.*

GENERAL REMARKS ON HEDGE TEARS.

A hedge tear usually assumes the following shape, and is darned like Fig. 1.

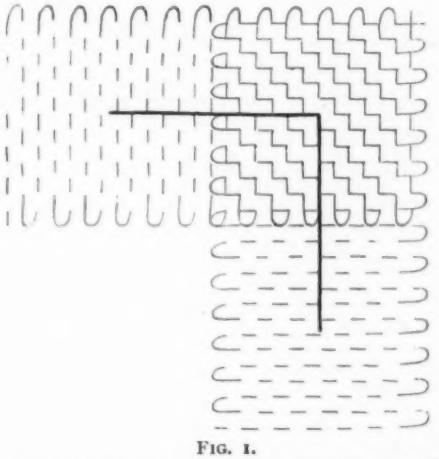


FIG. 1.

(*a*) *Materials to be used.*—At examinations the darning should be done on cream-coloured flannel, the threads of which are clear and distinct. Fine embroidery cotton, No. 35, or crewel silks in one or two colours, may be used. For practical mending use flax or flourishing thread for linen; for woollen fabrics use fine Angola or silk, and if any difficulty should arise in matching the colours, then unravel a piece of the stuff to be darned, and use the ravellings.

(*b*) *Practice of Darning.*—Practise the darn several times on canvas with the cut simply *pencilled or basted* in, and then on *open* flannel with the slit made.

(*c*) *Darn.*—As in the cross cut, take up two threads, and pass over two, leaving two threads of the material between each row.

Observe that, while in the cross cut each row was lengthened at one end, and shortened at the other, in the hedge tear every *alternate* row begins and ends on the same line.

(*d*) *How to cross the edges of the tear.*—When crossing the edges of the tear, you may (*a*) take the stitch of one row *over both* edges, and the stitch of the next row *under both* edges; or (*b*) take the stitch of the first row *over one* edge and *under the other*, and the stitch of the second row over the one you went under, and under

the one you went over in the row preceding, as in the following diagrams (see Figs. 2 and 3).

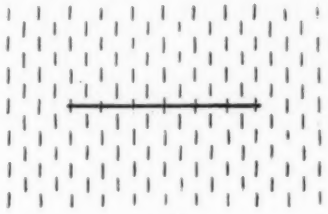


FIG 2.

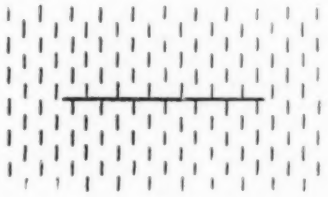
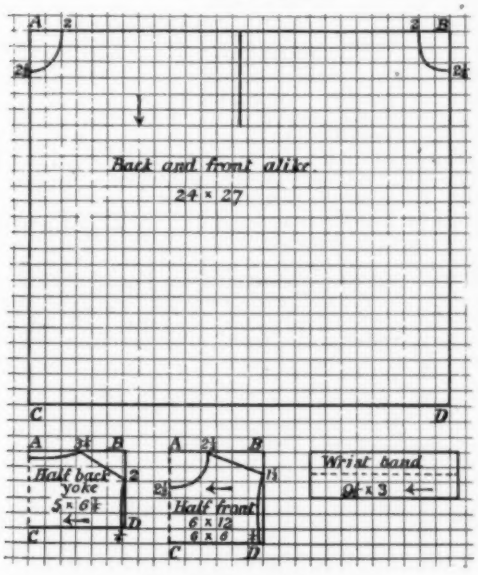


FIG. 3.

Remember that in an *actual* tear both sides are seldom, if ever, the same length—the selvedge side being usually shorter than the weft one.

OVERALL WITH PLAIN SLEEVES.

Back Opening.



Feather-stitching.—Any good sewing manual will teach how to work the stitch. But candidates who can feather-stitch beautifully often mar their work by leaving knots and loose ends of thread at the back of their work. This shows a deplorable want of 'finish.'

I. *Commencement of thread.*—On *double* material slip the needle in between the folds, about ¾ of an inch from the place where the 'feathering' is to commence; bring the needle out where the first stitch is to be made; take a small backstitch, and proceed as in Fig. 1.

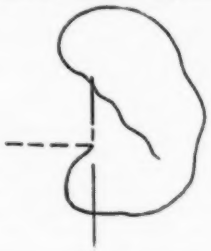


FIG. 1.

On *single* material leave a long end on the wrong side, take a small backstitch, and proceed.

After the 'feathering' is done, the *long end left on the wrong side*, and darn it over and under a few of the stitches on the wrong side, as in Fig. 2.

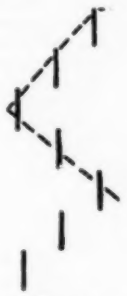


FIG. 2.

II. *Finishing off of old thread.*—After working the last feather-stitch which has to be made, *turn round the work*, and make two tiny backstitches; then slip the needle in between the folds, and bring it out on the *wrong* side about an inch from the place where it went in. Cut off what remains of the old thread. If on *single* material bring the needle through from the right to the wrong side, and darn *upwards* for a few stitches.

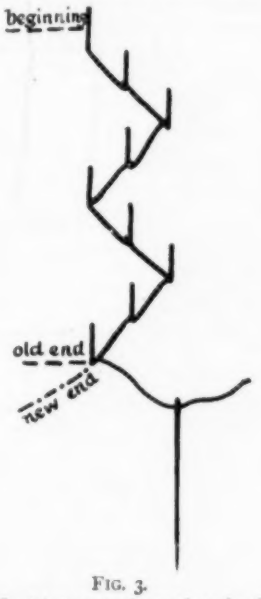


FIG. 3.

FIG. 4.

III. *Joining on of new thread.*—Combine the *fastening on* of the *new* thread and the *fastening off* of the *old* one (see Fig. 3 for *double* material, and Fig. 4 for *single* cloth).

THE INSPECTOR'S NOTE-BOOK.

BY AN INSPECTOR OF SCHOOLS.

'It is doubtless a fascinating sight to some people to see a charming uniformity a trim perfection; a strong will can easily produce it in inferiors. Spectaters applaud, but as soon as the shears stop work, the brambles take their revenge for having been clipped instead of rooted out.—THRING.

Bramble-clipping. Dr. Thring condemned rigid uniformity over 20 years ago. How many of us are bound hand and foot to-day? Take handwriting for example. First one man and then another comes before us with a new system. In our feverish desire for something new, we adopt the vertical or the non-vertical or anything else which appeals to us from the uniformity standpoint. Let us not discourage individuality. Of what advantage is it to turn out a hundred boys who read so much alike, that it is easy to tell the school to which they belong? It is time we renounced this pattern business. These are after all nothing save the remnants of the moribund system of percentages. As Thring says: 'It is a pleasanter, at least a less vexatious life, for the master to clip the boys to a pattern, and never allow a bramble to be seen, than to trust to growth to let the brambles grow too, and then pull them out as they appear; for this makes the fingers bleed; it makes the heart bleed, and the lookers-on scoff, but the work once done is done.'

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The country School as a training ground. I wonder how it is that a master of a country school finds it so difficult to procure advancement. For my own part I find as clever teachers in the country as in the town—sometimes cleverer; which is only common sense if one will weigh the thing. Ought not a young man from college to get a better training in school-craft, if he has to manage and teach all the standards at once, than if he is merely in charge of 50 or 60 children of one standard? To my mind a young man could not get a better training than to take a small school as a start. Unfortunately the prospects are such as to discourage the best men from doing this.

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It takes a clever driver to manipulate a four-in-hand. I have seen some clever manipulation of the various standards in the country. The first difficulty that presents itself is the organisation. If you have an Article 68 you have to put her to 1 and 2 whilst you take charge of the rest. Perhaps you have no help. Then you have a big job on hand to draw up a Time Table which will allow of your paying a flying visit to the various sections daily. It goes without saying that you group for whatever you can; *e.g. Recitation.*—Infants and Stand. I.; Stands. II. and III.; the rest. *Reading.*—Stands. I. and II.; III.; the rest; or, train V. and VI. to read by themselves, and then group III. and IV. In Spelling and Composition let VI. and VII. work alone whilst you take IV. and V., and group II. and III. for Spelling. Arithmetic is the worst subject for grouping. In fact you cannot group. The only thing to do is to take one standard on the blackboard daily. Throw Stands. I., II., III. together for object lessons, and IV., V., VI. for English or Geography. If unassisted do not attempt two class subjects.

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Class subjects in Rural Schools. Here I may give a little help as to class subjects in small schools. Firstly take only one unless you have help. It is better to do only one and do that well. Let that one be 'Elementary Science' (30 object lessons) for Stands. I., II., III. with English for the upper Standards. If you want a second subject take Geography throughout.

Several teachers have thought that object lessons are not admissible under this year's Code. It is true they are omitted from the list of class subjects, but all that is necessary is to call them by another name Elementary Science, or you may drop them if you wish, and teach Geography or any other class subject by means of object lessons.

The head teacher is responsible for the needlework. The subject of needlework in a small mixed school often occasions the master some anxiety, especially when taught by an outsider. It seems to me that every master should keep his eye on this subject. It is not necessary to be able to sew well one's self in order to be qualified to say whether a button-hole is or is not accurately and carefully worked. Once a quarter at least investigate the work of the girls in this subject and pass judgment on it in your general report.

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The best way to keep your record. At a few schools I visit the teachers keep brief daily diaries instead of quarterly syllabuses. This idea rather commends itself to me. I am told it is by no means a laborious task. You simply put down in a couple of words or so the subject of each lesson each day. The head teacher signs the diary weekly. It works out something like this:—*Monday* a.m. *Arithmetic.*—Problems on the blackboard. *Geography.*—General lesson on positions of colonies. *Composition.*—Essay on The Spanish-American War.

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Wanted a strong lead in Drawing. Room for originality. It is to be hoped now that teachers are not restricted to definite syllabuses in drawing they will show themselves equal to a little originality, and that schemes adapted to the various classes of schools will be offered. The co-ordination of Drawing with varied occupations should be considered. It is for those who have shouted the loudest anathemas against the Majors and their systems, to go one better as soon as they can for their own benefit as well as for the benefit of their fellows.

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ANSWERS TO CORRESPONDENTS.

J.C.—Yes, you are eligible. If you are teaching, ask your manager to send in your name on Form $\frac{9}{10}$, which goes to the Inspector, with Form IX., at the end of the school year. If you are not teaching, get your name sent in by some head teacher with whom you are acquainted.

J.T.—The notification of the result depends upon several things. If the school year ends in April, May, or June, you should get it with the annual report. If the school year ends in any other month, you should hear by the middle of May at latest.

R.P.R.—Your parchment will arrive immediately after the receipt of the annual report in February 1899. Should you be moving from your school after eighteen months' service, you can get your parchment early in December 1898, providing you have obtained a favourable report from the Inspector.

J.M.C.—I certainly do not think that your assistants will lose marks by not taking History and Geography. If such were the case, why should the Department offer an inducement to teachers to do well in these subjects at the Queen's Scholarship Examination?

J.U.—I know of two or three graduates—masters of primary schools—who wear their gowns on special occasions. It depends largely on the school. I know of two or three graduates—masters of higher grade Board schools—who wear their gowns as part of their daily insignia of office.

M., Reading.—Certainly continue Object Lesson instruction and call it Elementary Science. You are not obliged to take the same subject throughout. If you teach two class subjects and it is a small rural school, I suggest: First Class Subject, Standards I., II., III., Elementary Science (30 Object Lessons). Standards IV., V., VI., English modified course. See Schedule S and Alternative Course in English for schools taking another class subject in Standards I., II., III. Second Class Subject: Boys—Geography; Girls—Needlework.

J.E.L.—Read Art. 82 of the Code. If the school is a small one, you can take charge permanently. If the attendance is over 60, you could take charge for three months only. Art. 82 (*c*).

C.T.—There is a Physiography examination on the 23rd of June, held during the day time. You can obtain admission at any centre where they are taking the examination by applying to the Secretary of the Classes. If no examination is held at

Oldham, write to Secretary, Manchester Technical College, and sit there. There is an evening examination in Physiography. For date, see 'Science and Art Directory,' at the Library or Technical Institute. Marks would count for the Queen's Scholarship Examination in December. The evening examination would be held at the Institute in Oldham.

A.K.R.P.—I regret that I am unable to give you any information respecting admission into Edinburgh University. Since you live there, would the information be easily procurable from the Registrar, or from a calendar at a library? I can answer your second question. The University Preliminary Certificate would qualify you for admission without examination into a Training College.

W.P. is headmaster of a very large school. He has written to me for advice respecting Scheme B Arithmetic. My experience is that scarcely any schools take it. I should be glad to hear from any teacher of a fairly large school who takes it. Please let me know how it works. I will embody any opinions I think generally valuable in my notes.

Letters should be addressed—'Inspector, care of the Editor, 33, Paternoster Row, London.'

Replies by post can be obtained by enclosing an addressed stamped envelope.

In cases of urgency an extra stamp should be enclosed.

CLASS LESSONS IN DOMESTIC ECONOMY.

BY ETHEL R. LUSH.

Author of 'Chats with Children on Domestic Economy,' Head Mistress of the Ipswich Higher Grade Girls School, and Organising Mistress to the Ipswich School Board.

STANDARD IV.

Lesson XVII.

WASHING: NECESSITY FOR CLEANLINESS—PREPARATION FOR THE WASH—THE WASHING DAY.

'CLEANLINESS is next to godliness,' says the old proverb, and the more we inquire into the subject, the more convinced we are of the truth of the saying. The neglect of cleanliness is fraught with danger to the whole community, and a dirty person or a dirty neighbourhood should be avoided by all who wish to remain healthy. Let us see why the subject of cleanliness is of so much importance.

If you examine the surface of the skin with a magnifying glass, you will find it pierced with innumerable little holes. These are *pores;* when you get a little further on in the course, you will learn exactly what these pores are; for the present it is sufficient to know that they are there. From these pores perspiration and oil continuously issue, and remain on the surface of the skin, where they become mixed with the dust and dirt of the surrounding air. If not removed frequently and regularly, the mixture accumulates, stops up the pores and forms a layer of dirt, which gives off a disagreeable smell. Much of the dirt is taken up by the clothes, particularly those worn next to the skin, and if these garments are not regularly changed and washed, they, too, become offensive.

When the pores are stopped up, *perspiration cannot escape*, and ill health is brought about. *Dirt, too, favours disease.* Infectious diseases spread more rapidly among dirty people and in dirty districts than where cleanliness is practised. These particulars will suffice to show you the necessity of cleanliness. It is with the cleanliness of *clothes* that we have to deal now.

In most households, where the washing is done at home, a special day is set aside for it. The old rhyme says:

> Those who wash on Monday have all the week to dry;
> Those who wash on Tuesday are not so much awry.

But notwithstanding the preference indicated for Monday, thoughtful housewives generally choose Tuesday, because sundry preparations should be made the day before, and Monday is a more suitable day for this than Saturday.

Imagine, then, that we are going to have a family wash, and are getting the clothes ready. The first thing to be done is to sort the clothes into heaps according to their kind. Thus muslins, laces, and fine things generally, are put into one heap; collars, cuffs, white shirts, into another; table linen into a third; bed linen, underclothing, and fine towels, into a fourth; handkerchiefs into a fifth; coloured things into a sixth; flannels and woollens into a seventh; and coarse things, such as kitchen towels, dusters, and coarse aprons, into the eighth heap. This is called *sorting*, and during the process any article which needs mending should be set aside, and attended to. Stained or spotted articles should also be put on one side, and the stains removed before the washing day, as there will be no time then to do this.

It will help you to remember how *ink spots* should be removed if you watch the simple process. Here is a pinafore freshly stained with ink. First of all I soak it well in milk, and with a new stain this alone will be sufficient to remove it; to make quite sure, however, we will rub in a little salts of lemon dissolved in boiling water, and then rinse the place in clean water.

A grease spot is easily removed. Observe how I first make a ring round the spot with rectified benzine—this is to prevent the grease spreading—next I take a little of the benzine on a piece of flannel, and rub the grease spot with it until it is quite gone. Sometimes grease may be removed by putting a piece of blotting paper under the spot, and pressing it with a hot iron. The grease is melted by the heat, and absorbed by the blotting paper.

Fruit stains when wet are removed by rubbing salt well into them, and then pouring boiling water over the place. An old stain should be removed in this way: Make a weak solution of chloride of lime, and soak the stained part in it for about ten minutes, then wash out the chloride of lime, and rinse well.

After sorting comes *soaking*. It is important to know which things may be soaked, and which may not, or many good clothes may be utterly spoilt in the wash. Flannels and woollens should not be soaked, because they are very liable to shrink, and should be in the water only just as long as is necessary to cleanse them. Coloured things are not soaked, because water is apt to make the colours run or wash out. All other articles may be put to soak in cold or tepid soft water, so as to loosen the dirt beforehand, and make the actual washing less laborious. Very dirty things should be put into rather warmer water with a little borax. Collars and cuffs may be rubbed with soap before soaking. It is a good plan to fill the copper and lay the fire over-night, so that work may commence without delay on the washing morning.

We must jump now from Monday to Tuesday, and having risen betimes, light the copper fire, and while the water is heating, begin to wring out the clothes from the water in which they have been soaking all night. When the water in the copper is hot enough, you may begin to wash. Fill up the washing tub with water as hot as the hands can bear with comfort, and put into it the cleanest of the steeped clothes. Wash these well with soap on the right side, rubbing them carefully with your hands till they are clean. This is called '*firsting*,' or first washing. The next process is known as '*seconding*,' and is exactly like firsting, except that the water is changed, and the clothes washed on the *wrong* side.

Boiling is the next step. The clothes are transferred to the copper, care being taken that the water is not too hot, or the dirt will be fixed instead of loosened. A copper-stick is used to push the clothes under the water, and soap cut up into shreds, soda, or washing powder are put into the water to help to loosen the dirt. When the clothes are in, the water may be brought to the boil, and the linen allowed to boil for fifteen or twenty minutes. Fine muslins and lace goods which might be torn or soiled in the copper, are preferably boiled in a bag for protection.

Coarse things, which are often very dirty, should be boiled with a little paraffin oil and soda.

After boiling, the clothes must be *rinsed*, and great care must be bestowed on this operation, or the linen will not look a good colour.

The first rinsing is done in clean, warm water; if clothes are put straight into cold water, the soap is hardened in the texture, and the linen looks yellow. When all appearance of soap has been removed, a second rinsing is done in cold water, and the clothes are ready for *blueing*.

When white things have been washed with soap or soda, they acquire a yellow tint, and to counteract this, blue is used. You may buy this material in blocks or in a powder. In either case a small quantity is tied up in a piece of flannel and dipped into a tub of cold hard water until the required hue is obtained. Blue water should not be too deep, or the clothes become blue instead of white. The clean things are dipped into the blue water one by one, and wrung out at once; if you leave them in the water they become streaky.

Wringing must be done with care, or the linen may be injured. In wringing by hand avoid wrenching or pulling the clothes; first find the selvage, and twist the clothes accordingly, expelling the water by pressure. A wringing machine saves much labour; in using one of these machines, fold the garments with the buttons inside, so that they will not be broken or bent. Very fine things should be folded in a towel before wringing, or they may be torn.

As soon as the clothes are wrung out they should be *dried*. This should be done, wherever possible, in the open air. Rub the clothes-line well with a clean duster, and see that the pegs are clean, or the clothes that have taken so much trouble to wash may be soiled again by a dirty line. Dry the clothes on the wrong side, and hang them so that the wind can blow through them. While the white things are drying, attention may be paid to flannels and coloured things.

Flannels must be washed with great care. You will remember that they were not soaked because of their tendency to shrink. For the same reason they must be washed quickly. Make a lather with soap and soft water, neither very hot nor very cold. Move the flannels about in the soapy water until they are clean. On no account use soda; rub them with your hands, or put soap upon them; when flannels are rubbed, the sawlike edges of the wool fibres mat together, and the flannel becomes hard and stiff instead of soft and pliable. When they are clean, rinse them thoroughly in warm water, and squeeze them out. Another thing to remember is that flannel must not be wrung or twisted, or the fibres will, by this means, interlace and mat. Flannels must be dried quickly in the open air, if possible.

Coloured things are neither boiled, nor is soda used. Either of these practices would spoil the colours. Make a lather with soap and tepid water, and wash the clothes quickly on the right side. Then change the water, and wash with soap on the wrong side. Rinse in cold, hard water, in which a little salt or alum has been dissolved. Either of these minerals helps to set the dye. Wring them carefully, and dry quickly in a shady place, so that the sun will not cause them to fade.

Very fine things, such as lace, embroidery, and muslins, must be washed in warmer water than either flannels or coloured things, and should not be rubbed much, or the delicate fabric may be injured.

SUMMARY.

Necessity for cleanliness.—Clothing must be washed to free it from the accumulation of dirt and waste matter which it gathers from the skin and from the atmosphere.

Preparation for Washing.

1. Sorting.
2. Removal of spots and stains; mending.
3. Soaking in tepid water. N.B.—Flannels and coloured things are not soaked.
4. Filling the copper, and laying the fire.

Order of Washing.

1. Firsting: Washing the white things on the right side.
2. Seconding: Washing the white things on the wrong side in clean water.
3. Boiling in the copper with soap, soda, or washing powder.
4. Blueing, to restore the white tint.
5. Wringing.
6. Drying in the open air, if possible.

To wash flannels.—Avoid the use of soda; do not rub, boil, or wring flannels. Make a lather in warm water with soap, and wash the flannels till clean; rinse and dry quickly.

Coloured things must not be boiled or washed with soda. Wash in warm water with soap, and dry quickly.

(*To be continued.*)

A SCHEME OF OBJECT LESSONS FOR COUNTRY SCHOOLS.

BY WILLIAM DONE, B.A.,

Head Master of the Pupil Teachers' School, Brighton.

ARTICLE 9 in 'Instructions to Inspectors' has a very useful warning concerning Object Lessons on Animal Life. It runs thus: 'You will discourage, as far as you possibly can, the killing of birds and other animals, and the purchase of stuffed specimens to be placed in the school museum. The charm of a lesson given to young children on animal life lies in the observation of the movements of the living animal, and in its adaptation to its usual surroundings.' Apart altogether from the wanton destruction of life, one can scarcely imagine anything more depressing than the appearance of the ordinary ill-stuffed specimen. A provincial museum, with its heterogeneous collection of woe-begone animals, usually has a great deal to answer for in this respect.

On the other hand, such a place as the Natural History Museum at South Kensington, where the birds are placed in their natural surroundings, is of the greatest possible use and interest.

The teacher should discourage the keeping of our wild singing birds in cages.

Another word of advice is necessary against making a series of Object Lessons too scientific. Of course it is Science in so far as it aids the children to observe some of the facts of nature upon which Natural Science is founded; but as it deals with such topics without formal arrangement, it differs widely from the systematic study of a particular science.

For a country school the following might be a good course of lessons:—

I. *The Farmyard.*—Its buildings and their contents. The animals kept on a farm, and their uses. The various people employed.

II. *The Dairy.*—Why built in a cool place. The inside walls usually glazed. Everything connected with it very clean. The floor, the shelf with the shallow pans. The milk and its colour, the cream, the butter. The dairy-maid.

III. *Butter.*—The skimming of the cream and the placing of it in the churn. Picture of churn. What takes place inside the churn. Illustrate by shaking some cream in a bottle. The butter milk. Fresh butter and salt butter.

IV. *Cheese.*—Show, by putting some rennet into milk, how the latter separates into curd and whey. Take the curd and press so that it becomes more solid. Show the picture of a cheese-press. Why salt is added. The colour of cheese. New cheese and old cheese. Districts where different varieties are made, and their characteristics.

V. *Fowls.*—The small head and stout body. The strong beak, and why. The arched tail. Shape of the foot. Difference in appearance between cock and hen. The spurs. What the fowls eat. The eggs. Different breeds of fowls.

VI. *The Hen's Egg.*—Two or three eggs as specimens, one boiled hard. The shape of the egg, one end broader than the other. The shell porous, white, nearly opaque. The thin membrane lining the shell. The 'white' of the egg; the yolk. The difference in flavour between these two parts of the egg. How the eggs are arranged in a hen's nest. How long the hen takes to hatch the eggs.

The next number of 'The Practical Teacher's Art Monthly' will contain a paper entitled 'HOW TO SKETCH FROM NATURE,' by W. E. Sparkes.

PROBLEMATIC TESTS FOR ALL STANDARDS.

***** ARRANGED FOR THE FOUR QUARTERS, SO THAT THEY CAN BE USED ALL THE YEAR.**

Standard I.—3rd Quarter.

31. There were nine panes of glass in each of two windows; seven panes were broken. How many whole panes were there?

32. I have three hundred nuts altogether in my three pockets, forty-seven are in one pocket, and twenty in another. How many nuts are there in the third pocket?

33. A boy spent fourpence out of two shillings. How many pennies had he left?

34. A score of potatoes was taken away from eight hundred potatoes. How many remained?

35. Fred had 172 marbles at home, and one hundred and forty-two marbles in his pocket. He sold two hundred and fifty. How many had he left then?

36. In a barrel there were twelve dozen apples. Six and a half dozen were taken out. How many apples remained in the barrel?

37. I had ten pence, and 48 pence, and one hundred pence in my bags. I spent half of the hundred pence. How many had I then?

38. A farmer has in his fields two hundred and twenty cows, three hundred and thirty-seven sheep, and four hundred and ninety-three lambs. If he takes away half the cows, how many animals will remain in the fields?

39. In a school there are 435 boys and 247 girls. How many are there altogether, and how many more boys than girls?

40. A boy is told to make up 4 bundles of onions, each containing thirty-six onions. In one bundle he puts only 31. How many onions does he make up?

41. I spend eleven pence, twelve pence, and three pence out of forty pennies. I then earn 15 pence. How much have I then?

42. How many minutes are there in one hour, half an hour, and a quarter of an hour?

43. In a class there were 4 rows each containing six boys, and three boys stood at the side. How many boys were there in the class?

44. In five pages there were 73 words, ninety-six words, forty-five words, 81 words, and ninety-eight words. How many words more were required to make up five hundred?

45. At a school examination there were 305 children present; if ninety-two were sent home, and 35 sent into the playground, how many children would be left in the school?

STANDARD I.—ANSWERS.

3rd Quarter.

31. 11 panes.
32. 233 nuts.
33. 20 pennies.
34. 780 potatoes.
35. 64 marbles.
36. 66 apples.
37. 108 pennies.
38. 940 animals.
39. 682 children; 188 more boys than girls.
40. 139 onions.
41. 29 pence.
42. 105 minutes.
43. 27 boys.
44. 107 words.
45. 178 children.

Standard II.—3rd Quarter.

31. A man had two hundred yards of cloth. He sold 36 pieces 3 yards long. How many yards did he not sell?

32. If I have one thousand and eight nuts for 7 boys, how many would each receive?

33. How many dozen are there in 81 times eighty-four?

34. A hawker bought two hundred peaches at a penny each. He sold a quarter at 3 pence each, and the rest went bad. How many pennies did he lose?

35. From the sum of 4,728 and 9,654, take away the difference of half-a-million and 489,307.

36. There were seven hundred and eighteen thousand two hundred and fifty-nine sweets to be shared amongst 8 boys; how many would each get, and how many sweets would be left?

37. After taking one egg from a box containing four hundred and one eggs, I divide the rest into 10 equal parts. How many are there in each part?

38. A field measures nine thousand seven hundred and twenty-eight yards round its four equal sides. What is the length of each side?

39. A cyclist rode 73,560 miles in 12 years. How far is that per year?

40. Eight counters at an election count thirteen thousand seven hundred and four voting papers. How many did each man count on the average?

41. Eleven ships together bring into port, 7,298 boxes of sugar; 2,570 boxes of dates; 3,703 boxes of oranges; 9,001 boxes of nuts; 18,509 of tea; and 5,614 boxes of apples. How many boxes is that for each vessel, on the average?

42. If 3 girls can sew on one thousand two hundred and thirty-nine buttons in a week, how many could 19 girls sew on in the same time?

43. Seven hundred and sixty-nine handkerchiefs and five hundred and seventy-five pinafores were given away to 12 girls. How many articles would each receive?

44. Three hundred and sixty-five men each make 365 nails. How many more nails will be required to make up three-quarters of a million?

45. What will a train of 54 waggons, each carrying 37,250 pounds weight of coal, carry?

STANDARD II.—ANSWERS.

3rd Quarter.

31. 92 yards.
32. 144 nuts.
33. 567 dozen.
34. 50 pennies.
35. 3,689.
36. 89,782 sweets each; and 3 sweets left.
37. 40 eggs.
38. 2,432 yards.
39. 6,130 miles.
40. 1,713 papers.
41. 4,245 boxes.
42. 7,847 buttons.
43. 112 articles.
44. 616,775 nails.
45. 2,011,500 pnds.

Standard III.—3rd Quarter.

31. A man bought 1,000 eggs at 4 for 5d. and sold them at one penny each. Find his gain or loss.

32. A dealer made a profit of £65 13s. 7d. by selling a horse for £317 10s. 4d. What did he pay for it?

33. A bank clerk copied £71,116 15s. 7½d. instead of £17,161 15s. 11½d. How much was he wrong?

34. Find the difference between eighteen thousand one hundred and one pounds eleven shillings and three halfpence, and 10s. 6¾d.

35. A farmer went to market and sold a number of sheep for £7,256 15s. 6½d., and bought a number of cows for five thousand one hundred and ninety-eight pounds six shillings and ninepence. How much more did he receive than spend?

36. How much more than £54 17s. 6½d. is fifty-three guineas?

37. Which would you rather possess, 85 guineas or 3,281 shillings, and why?

38. Tom has £701 10s. 9½d., and Harry has two hundred and thirteen pounds fourteen shillings and three pence three farthings. If Tom gives £97 15s. 6d. to Harry. How much will each have then?

39. £101 14s. 8d. minus nineteen pounds fifteen shillings and sevenpence halfpenny.

40. A house and land together are worth £7,125 18s. 9d., and the house alone is worth £3,272 14s. 11½d.; how much more is the land worth than the house?

41. A man carried home £7,510 14s. 5½d., and had deposited three hundred and ninety-seven pounds fifteen shillings and ninepence in the bank. How much money had he at first?

42. How much must be added to six pounds and eightpence to make two thousand pounds eighteen shillings and ninepence halfpenny?

43. John has as many sixpences as Fred has half-crowns. Fred has £41 12s. 6d. How much has John?

44. £396 14s. 10¾d. plus eight hundred and seventy-six pounds and ninepence halfpenny, minus £793 15s. 9¼d.

45. If John had had double of what he had, he would then have had £17 15s. 4½d. more than Tom. John had £39 17s. 8¾d. What had Tom?

STANDARD III.—ANSWERS.

3rd Quarter.

31. £1 0s. 10d. loss.
32. £251 16s. 9d.
33. £53,954 19s. 8d.
34. £18,101 0s. 6¾d.
35. £2,058 8s. 9½d.
36. 15s. 5½d.
37. (*a*) 3,281s., (*b*) £74 16s. more.
38. Tom, £603 15s. 3½d.; Harry, £311 9s. 9¾d.
39. £81 19s. 0½d.
40. £580 8s. 10d.
41. £7,908 10s. 2½d.
42. £1,994 18s. 1½d.
43. £8 6s. 6d.
44. £478 19s. 11d.
45. £62 0s. 1d.

Standard IV.—3rd Quarter.

31. A clock ticks 3 times every two seconds. How many times will it tick in 15 days 7 hrs.?

32. A tea chest containing 5 cwt. 1 qr. 24¾ lbr. was made into 129 parcels. How many ounces were there in each parcel?

33. Tom saves 1½d. a day and Henry 2s. 8½d. a calendar month. How much will they have together at the end of the year?

34. A woman buys 1¼ pints of milk a day. How many gallons, etc., will she buy in a year?

35. How many minutes are there from 9 o'clock on Monday morning to 4.30 on Friday afternoon?

36. A boy saves 3d. a week. How long will it take him to save three and a half guineas?

37. What is the cost of 17 tons 18 cwt. of coals at 1s. 2½d. per cwt.?

38. How many florins are worth 276 half-crowns?

39. Two stations are 185 miles apart. A train travels 65,120 yards an hour; how long will it be in going from one to the other?

40. 63 gallons of wine cost £75 12s.; what is the value of a pint?

41. A grocer bought 700 dozen eggs at 8½d. a dozen. He found 60 broken, and sold the rest at 6 for 5d. What did he gain?

42. A boy rises at 6.45, and his sister at 7.30. How many hours does he gain during the month of April?

43. What does a person receive during the last three months of a year, if he receives 2d. a day?

44. If three pennies weigh an ounce, what will £5 worth of pennies weigh?

45. How many times can 4 pks. 1 gal. be taken from a bag of flour containing 13½ bushels?

STANDARD IV.—ANSWERS.

3rd Quarter.

31. 1,981,800 times.
32. 76 ounces.
33. £3 18s. 1½d.
34. 68 gals. 1 qt. 1½ pts.
35. 6,210 min.
36. 5 years 34 weeks.
37. £21 12s. 7d.
38. 345 florins.
39. 5 hrs.
40. 3s.
41. £4 3s. 4d.
42. 22½ hrs.
43. 15s. 4d.
44. 25 lbs.
45. 12 times.

Standard V.—3rd Quarter.

31. Find the least number which will contain the numbers from 1 to 12.

32. A peal of 5 bells ring at intervals of 6, 9, 15, 24, and 30 seconds. At what intervals will they ring together?

33. In the following fractions, four of them are of the same value; pick them out and add them together:—

$\frac{2}{3}$, $\frac{8}{15}$, $\frac{6}{9}$, $\frac{4}{20}$, $\frac{7}{35}$, $\frac{4}{18}$, and $\frac{8}{28}$.

34. What fraction must be added to the sum of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{10}$ to make the result a whole number?

35. A boy had a cake, and he gave his brother $\frac{1}{3}$ of it and each of his two sisters $\frac{1}{4}$. What part did he keep for himself?

36. The sum of 2s. 3d. was divided among 3 boys. The first received $\frac{1}{3}$ of it, and the second $\frac{1}{4}$ of the remainder. What did the third get?

37. A man is seventy-five years old. His son is three-fifths of his age and his grandson two-ninths of his father's age. How old is the grandson?

38. A person spends $\frac{1}{2}$ of his income in rent, $\frac{1}{3}$ in clothing, $\frac{1}{8}$ in food, and has £60 left. What is the amount of his income?

39. A gentleman left one-seventh of his property to each of his four sons, one-eighth to each of his three daughters, and the remainder to his servants. What was the servants' share?

40. What is the least number of nuts that can be equally divided among 6, 8, 10, 12, and 16 children?

41. Two coaches start in the same direction at the rates of 7½ miles and 6¾ miles per hour. How far will they be apart in 18 hours?

42. A boy filled one-fifth of a book on Monday, one-sixth on Tuesday, and two-sevenths on Wednesday. How much was there left?

43. A man sold one-third of his flock to one man and one-half to another, and had 75 sheep left. How many had he at first?

44. Find a fraction equal to $(\frac{3}{4} - \frac{2}{3}) + (\frac{1}{2} - \frac{1}{3})$.

45. How much more is $\frac{2}{3} - \frac{4}{10}$ than $\frac{5}{8} - \frac{2}{7}$?

STANDARD V.—ANSWERS.

3rd Quarter.

31. 27,720.
32. 6 min.
33. $\frac{1}{5}$.
34. $\frac{7}{20}$.
35. $\frac{1}{12}$ of the cake.
36. 1s. 1½d.
37. 10 years.
38. £480.
39. $\frac{5}{8}$ of the property.
40. 240 nuts.
41. 13½ miles.
42. $\frac{7}{210}$ of the book.
43. 450 sheep.
44. $\frac{41}{120}$.
45. $\frac{1}{30}$.

Standard VI.—3rd Quarter.

31. The floor of a room 11 feet by 8⅓ feet is partly covered by a carpet measuring 9 feet by 6⅓ feet. How much of the floor is left uncovered?

32. What is the simple interest on £684 6s. 8d. for 1 year 9 months at 3½ per cent. per annum?

33. A cistern is filled by a pipe in 3 hours, and emptied by another in 5 hours. If both pipes are opened together, how long will it take to fill the cistern?

34. How much water must be added to 90 gallons of spirits at 12s. 6d. a gallon to make the price equal 8s. a gallon?

35. Reduce the expression $\left(\frac{3\frac{1}{2}}{7} + \frac{2}{10\frac{1}{2}} - \frac{5}{18} \text{ of } \frac{4}{7}\right) \times 1\frac{3}{4}$ to its simplest form.

36. What will it cost to paint a ceiling 12 feet long by 11½ feet broad at 3s. 9d. per square foot?

37. Find the simple interest on £720 for 73 days at 3½ per cent. per annum.

38. A man sold ·37 of his estate to one person, and then $\frac{4}{11}$ of the remainder to another person. What part of the estate did he retain?

39. The first, second, and fourth terms of a proportion are 13½, 4⅔, and ·455. What is the third term?

40. Find the simple interest on £632 for 27 months at 5¾ per cent. per annum.

41. How many yards of carpet 40 inches wide will be required to cover the floor of a room 36 feet long by 6 feet 8 inches wide?

42. The sum of £231 18s. is to be raised in a parish, the assessment of which is £3,092. What is the rate in the £?

43. 7 lbs. of sugar are worth 2 lbs. of coffee, and coffee is 2s. 9d. per pound. How many lbs. of sugar can be bought for £7 15s. 6d.?

44. A man bought 7,566 oranges; $\frac{3}{13}$ of them were bad. He sold the good ones at 4 for 3d. How much did he get?

45. Find the capacity of a box 3 feet 4 inches long, 2 feet 8 inches broad, and 14 inches deep.

STANDARD VI.—ANSWERS.

3rd Quarter.

31. 3 square yards 8 square feet.
32. £38 18s. 5$\frac{3}{10}$d.
33. 7½ hours.
34. 50⅝ gallons.
35. $\frac{5}{6}$.
36. £25 17s. 6d.
37. £5 0s. 9$\frac{3}{8}$d.
38. $\frac{51}{1000}$.
39. $\frac{888}{1369}$.
40. £81 15s. 3$\frac{3}{8}$d.
41. 24 yards.
42. 1s. 6d.
43. 197$\frac{19}{11}$ lbs.
44. £20 0s. 1$\frac{1}{2}$d.
45. 10$\frac{19}{17}$ cubic feet.

Standard VII.—3rd Quarter.

31. If I invest £3,963 15s. in the 3 per cents. at 94⅜, what annual income shall I receive from the investment?

32. What length must be cut off a piece of cloth 16 inches wide to contain a square yard?

33. In what time will £175 amount to £402 10s. at 3 per cent. per annum?

34. In a school 465 scholars are present and 7 per cent. are absent. How many scholars attend the school?

35. A man has £500 stock in the 3 per cents. at 82½. He transfers to the 3½ per cents. at 96½. Find the difference in his income.

36. What length of carpet 16 inches wide will cover a floor 12 yards long and 10 yards wide?

37. Divide £392 among A, B, and C so that A may have 5 times as much as B, and B 8 times as much as C.

38. Two trains start from stations 246 miles apart at 8.30 a.m. They travel towards one another, one at the rate of 53½ miles an hour and the other at 28½ miles an hour. At what time will they meet?

39. By investing in the 3 per cents. at 79⅞ my income is £237. What do I invest?

40. A rectangular grass lawn is 80 feet long by 30 feet broad. A walk 4 feet wide surrounds the grass. Find the area of the walk.

41. After paying an income-tax of 3½ per cent. I have £178 16s. 8d. left. What is my income?

42. A carpenter earning 9d. an hour, works the following hours for a week: 7, 9½, 10½, 8, 10½, 6. Find his average daily earnings.

43. A person buys £500 worth of stock at 97½, and sells out again when they have sunk to 83½. How much does he lose?

44. The average price of 36 yards of cloth was 4s. per yard; 4 yards were valued at 3s. 6d. a yard, 7 yards at 6s. 2d. a yard, and 9 yards at 2s. 4⅔d. a yard. Find the average price of the remainder.

45. What number becomes 156 when decreased 7½ per cent.?

STANDARD VII.—ANSWERS.

3rd Quarter.

31. £126.
32. 6 feet 9 inches.
33. 43⅓ years.
34. 500 scholars.
35. None. Income in each case is £18 3s. 7$\frac{7}{11}$d.
36. 270 yards.
37. A £320, B £64, C £8.
38. 11.30 a.m.
39. £6,310 2s. 6d.
40. 104⅔ square yards.
41. £185.
42. 6s. 5½d.
43. £68 2s. 6d.
44. 4s. 1d.
45. 168.

THE FIRST EXAMINATION OF A SCHOOL OF SCIENCE.

SCHOOLS of Science are rapidly increasing in number and, as the examination and inspection of a School of Science differ in many very material respects from those of an ordinary school, whether primary or secondary, the Editor of the PRACTICAL TEACHER has thought that an account of an actual examination of such a school cannot fail to be both interesting and instructive, especially to those who are for the first time preparing for the ordeal. The examinations all take place in June or July, since the school year ends on the 31st of the latter month, and the examinations must be over before this date. Under recent regulations the school year may end on December 31st instead of July 31st. The Inspector had become intimately acquainted with the school before the examination, seeing that, in the course of the year, he had paid us no less than six surprise visits, at each of which, however, he had been conspicuously anxious to assist as much as possible in the development of the school by seasonable advice.

On the morning of the examination, at 9 a.m., the two Inspectors first of all called for the worked books of the students in order to go through these most carefully, the Laboratory books and the French books coming in for especial attention.

The **Freehand** and **Geometry** (Second Grade) were judged entirely from the work done in the past year, no exercise whatever being set in those subjects.

The **Mathematics** was judged by a worked paper so far as concerns the Algebra and the Arithmetic, and by oral blackboard work in Euclid. The paper is given below. The Euclid taken for the year consisted of the first 26 props. of Book I. Students were successively called up to do the V., XVI., XX., and XXVI. propositions, questions being asked to see if exercises on the propositions could be done, although no such exercises were actually set.

ARITHMETIC AND ALGEBRA PAPER.

1. Factorise
   (*a*) $m^2 - 13mn + 40n^2$.
   (*b*) $a^2 + 54a + 729$.
   (*c*) $88 + 19x + x^2$.

2. Solve $\frac{x+7}{11} - \frac{2x-16}{3} + \frac{2x+5}{4} = \frac{16}{3} + \frac{3x+7}{12}$.

3. Simplify $\dfrac{1}{1 + \dfrac{\dfrac{1}{x}}{1 + x + 1 - x}} \cdot \dfrac{2x^2}{}$

4. Find H.C.F. and L.C.M. of
   $x^4 + x^2 - 6$, $x^4 - 3x^2 + 2$.

5. Which is the cheaper way of buying eggs, 9d. per doz. or 16d. a score? What is the difference in the price of one egg?

6. $\dfrac{3\frac{3}{7}}{\frac{2}{5}\ (\frac{3}{22}\text{ of }7)} + \dfrac{5\frac{5}{8}}{4\frac{1}{2}}$ of $\dfrac{4 - (3\frac{1}{2} - 1\frac{1}{2})}{3\frac{1}{15} - 2\frac{3}{80} + \frac{1}{10}}$.

7. $(\cdot0057 \times 2\cdot09 \div \cdot361)^2 - (\cdot00165 \times \cdot077 \div \cdot0105)$.

The above questions were answered by a sample of the school only, the remainder having been told off for practical chemistry and physics in the laboratory, where the following exercises were set:—

CHEMISTRY.

1. Take a portion of the substance given. Bring it to an oxide in the simplest way, and find out what percentage of oxygen is in the oxide. (The substance was magnesium.)

2. Take about a gram of the given substance and strongly heat it. Weigh again, and from the figures thus obtained proceed to calculate what would be the loss on heating 100 grams of the substance. (The substance was magnesite.)

3. Heat a little of the given substance in a test tube, first gently and then strongly, and test to see if there is any evolution of gas? If a gas is evolved, name it. (Permanganate of potash.)

4. Compare the action of heat, water, and concentrated H_2SO_4 upon the substances given you. (Magnesium carbonate and potassium chloride.)

5. Find out what the given substance is by heating it with concentrated H_2SO_4. (Oxalic acid.)

6. Heat a weighed portion of the substance given, and calculate the volume of the gas given off from 100 grams of the substance. What is the gas that is evolved? (Chlorate of potash.)

7. Weigh out a gram of the substance, and strongly heat it. Calculate the loss on 100 grams. (Potassium ferrocyanide.)

8. The substance given you is soluble in water, but not in hydrochloric acid. Prepare a body from it which is insoluble in both water and hydrochloric acid, or in one of them. (Substance given was lead nitrate.)

PHYSICS.

1. Compare the diameters and the volumes of the two unequal spheres supplied to you.

2. Find the weight of a lead pencil without weighing it.

3. Describe two ellipses, one having a long diameter of 5 ins. and the other of 6 ins. Measure the semi-minor axes, and divide the circumferences by the diameters.

4. Extend a piece of string 1 metre long, and attach a 100 gram weight to it. Make a pendulum of the two, and calculate the number of oscillations per minute. Repeat the experiment, using first a 50 and then a ten gram weight. What is the inference to be drawn from this experiment?

5. Draw an irregular quadrilateral. Calculate the area of it in s. cms. and in s. ins., and proceed to construct a square equal to the quadrilateral in area.

6. Find the volumes of the given cone and sphere.

7. Find the centre of gravity and the area of the given piece of cardboard.

8. Determine the specific gravity of the given marble, and by the aid of this solid determine the specific gravity of the given sample of milk.

9. Find the specific gravity of the two given pieces of wood without putting them in water.

10. Find the specific gravity and the volume of the given pebble.

11. By making use of the principle of moments, determine the weight of your metre scale.

The oral examination in Chemistry and Physics consisted in questions arising out of the above exercises. In Chemistry, for example, questions were asked concerning the preparation and properties of carbon monoxide, and the students were asked to apply the burning of magnesium to the determination of the chemical equivalent of that metal; the proper understanding of what is meant by equivalent being insisted upon. In Physics, the questions related to specific gravity, to the lever, and the principle of moments, and to the pendulum; the meaning of a complete oscillation, or a 'swing-swang,' as the Inspector termed it, being the subject of several questions.

FRENCH.

The written examination in this subject consisted in the translation of the following sentences into French; but most value was attached to the conversational exercise, which the master was invited to conduct:—

1. The horse was soon fatigued.
1. Who sings the best?
3. Snow does not always fall.
4. The wheat is blessed by God.
5. Would you cherish an animal much if you should find one?
6. Here is my door, I will give it a knock.

The conversation was conducted by means of one of **Nelson's French Object Lessons Charts.** The students were asked to name the various articles pictured on the chart, and to say a few words as to the uses and the qualities of each. Thus, the master said 'Où est le père?' 'Le voici, monsieur.' 'Que

fait-il ?' 'Il parle à son petit garçon,' and so on, the various articles on the table and in the room being severally named and simply discussed, by which means a fairly copious flow of conversation was obtained. The students also recited some French poetry that they had learnt by heart, the pronunciation being very carefully observed during this exercise. The examination in French concluded in a reading test, each student being required to read a few sentences from the French reader, and to construe these into good idiomatic English. Here again the accent was noticed and remarked upon, sometimes adversely, sometimes in terms of approval. It was agreed by the Inspector that, as conversational French was the aim of the master, slips in grammar might be passed over in the early stages of the study. It was now half-past twelve, so work was suspended for the morning, the Inspector asking that everything might be got ready for the Woodwork test to be taken first thing in the afternoon session. This was accordingly done, and, shortly afterwards the boys were marshalled for questions on the theory part of their woodwork. Questions were put to them as to the wood of which their chisels and planes were made, the Inspector being anxious to discover if the boys knew the qualities of the various woods upon which their suitability for use in special cases depends. He then passed on to questions as to the names of the different parts of the tools and the special use of each part. This ended the oral part of the work, and the boys filed to their benches. Plan and elevation of a simple half-lap joint were placed on the board. This had to be copied in the drawing books, and an isometric view had to be supplied. Each boy now had to saw off a piece of quartering, to plane down to 9 in. × 1¼ in. × 1 in., and to proceed to the construction of the joint in question. The wood served out was ordinary yellow deal, rather coarse in texture. This the Inspector commented upon, saying that it put the boys at a disadvantage when compared with others working on finer woods, such, for example, as American white wood, which the Inspector strongly recommended as likely to show the work of the boys to the best advantage.

English was the next subject on the list, and accordingly the school was orally examined in *Julius Cæsar*, questions being put on the history of Rome as bearing upon the play and upon the characters of the chief of the *dramatis personæ*. Oral parsing, analysis, and word derivation brought this part of the examination to a close, upon the heels of which came the examination in Commercial Geography. The scope of this branch of geography was first touched upon, and questions upon England as a trading nation followed each other in quick succession. Questions on the raw material were next put, the various ores of iron, copper, tin, lead, etc., being especially asked for. Trade routes and means of communication led to some rather lengthy questioning on the relative cost of road, railway, and water transit, and as to the connection between good natural roads (rivers) and the opening up of Continents, Africa being compared to its disadvantage in this respect with British North America. This concluded the examination, and the boys were dismissed. A conference now took place between the master and the Inspector, the latter speaking of the work in appreciative terms, and giving a few hints as to improvements. He recommended a reduction in the amount of work done, and also suggested that such subjects as Shorthand and Book Keeping, taken by a few of the students only, should not be put down for examination, but should be regarded as extras beyond the inspectorial purview.

Several students were absent on account of illness, but it was fondly hoped by the master that this would not prevent them from earning the capitation grants. When, however, the list of grants came to hand it was found that no grant whatever was allowed for these absentees, because a medical certificate of indisposition had not been forthcoming. As the Inspector did not press for a certificate, this struck one as rather a harsh proceeding. Masters of Schools of Science will be wise to insist upon the production of the desired medical certificate should any of their qualified students be prevented by illness from being present on the examination day. For the sake of comparison and suggestion the First and Second Year Syllabuses used in the school in question are given.

SYLLABUS OF WORK FOR FIRST AND SECOND YEARS.

FIRST YEAR.

(1) *Chemistry*	Theoretical and Practical. (X and Xp S. & A. Department's Syllabus.)
(2) *Physics*	Mensuration, Mechanics, and Hydrostatics.
(3) *Mathematics*	(*a*) Euclid, Propositions I. to XXVI. (*b*) Algebra. To Simple Equations (inclusive). (*c*) Arithmetic. Vulgar and Decimal Fractions, Averages, Percentages, and Simple Interest.
(4) *Geometry*	Geometrical Drawing (Art).
(5) *Drawing*	Freehand (Second Grade).
(6) *French*	1st Year's Course (Nelson's). Reading as in this Course, also St. Luke. Memory Work, V. Chapter of St. Matthew, Lord's Prayer. Conversation on easy topics.
(7) *English*	L'Allegro, Il Penseroso, Lycidas, Parsing and Analysis, Composition.
(8) *Woodwork*	(1) Sawing, (2) Planing, (3) Gauging and Sawing, (4) Sawing and Trenching, (5) Oblique Trenching, (6) Angle Half Lap Joint, (7) Half Lap Joint, (8) Lapped Halving, (9) Tongue and Groove, (10) Half Dovetail Halving, (11) Dovetail Halving, (12) Bevel Halving.
(9) *Needlework*	(*a*) To make a small nightgown or a man's nightshirt. (*b*) As in Second Year.
(10) *Bookkeeping*	Stage I., A.K. Sarll's Course.
(11) *Geography*	Commercial Geography of the Colonies.

SECOND YEAR.

(1) *Chemistry*	(*a*) Theory—Non-metallic Elements and their chief compounds. (*b*) Practice—Recognition of Non-metallic Radicals, Preparation of Bodies, Use of Potassium Permanganate Solution in Volumetric Analysis, Acidimetry and Alkalimetry.
(2) *Physics*	(*a*) Theory—Sound, Light, and Heat, elementary stage as in S. & A. Department's Syllabus. (*b*) Practice—Laboratory work bearing thereupon.
(3) *Mathematics*	(*a*) Euclid (Books I. and II). (*b*) Algebra as in 1st year, Indices, Surds, Quadratic Equations, and Problems leading thereto. (*c*) Arithmetic, as in 1st year.
(4) *Geometry*	Science Subject I. (Plane and Solid Geometry) Elementary Stage.
(5) *Drawing*	Model 2B.
(6) *French*	Nelson's Second French Book, La Grammaire, Un Philosophe sous les Toits; Reading—Exercises in Nelson's 2nd French Book, St. Luke, Grammar to irregular verbs, Conversation.
(7) *English*	L'Allegro, Il Penseroso, Lycidas compared with In Memoriam (Tennyson) and Adonais (Shelley), Analysis and Parsing, Composition.
(8) *Woodwork*	The following joints: (1) Half-mitred Halving, (2) Closed Mortise and Tenon, (3) Open ditto, (4) Bridle, (5) Dovetail Mortise and Tenon, (6) Notched Cross Halving, (7) Common Dovetail. Objects to be made—(1) Pot Stand, (2) Pen Box, (3) Bracket, (4) Marquetry Stool Top.
(9) *Bookkeeping*	Part II., Sarll's Exercises.
(10) *Needlework*	(1) To make a small nightgown or a man's nightshirt. (2) To mend a hole in stocking-web material. (3) Paper patterns cut out and tacked together of the garments mentioned in (1) to measurements stated.
(11) *Geography*	Commercial Geography of the Colonies.

BRITISH MUSEUM 1 JU98

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Head Master of the Belvedere Pupil Teachers' Centre, First on Scholarship List, Author of 'Scholarship School Management.'

PUPIL TEACHERS' COURSE.

AUTUMN EXAMINATION, 1898.

EIGHTH MONTH.

WORK TO BE PREPARED.

A.—*English.*

(Students are invited to write for assistance in case of ifficulty not taken in the course).

First Year.

Prepare lines 274–307 ('Lay of the Last Minstrel') with all meanings, allusions, &c.

Second Year.

1. Tabulate prefixes in the next 100 lines of 'The Task.'

2. Prepare lines 756–779, with derivations of all important words.

Third Year.

1. Learn 20 roots and meanings per week.

2. Prepare lines 743–859 'Comus,' with meaning of all allusions and the derivations of all important words.

Notes. '*Lay of the Last Minstrel.*'

Line 274. *Free* = freely (adv.).
275. *to find his hardihood* = object of *strove*.
278. *For* = Illative Conjunction.
282. *Fain* = Adj. qual. *he* predicatively. *Full* = Adv. of Degree limiting *fain*.
283. To brighten Cheviot gray = Object of *began*.
284. To *see*. Infinitive of purpose mod. 'joyed.'
285. *As* = Adv. of Deg. mod. *well*. } Extension of Predicate *said*
well = Adv. of man mod. *said* }
as = Adv. Conj.
291. Note inverted sentences—*Every flower* nom. to *wakened*.
Violet ,, *peeped*.
Rose ,, *spread*.
294. } Lovelier and paler, Adjs. qual. *she*. Supply *than the rose is lovely*
295. } *and than the violet is pale*.
297. *Maid* in apposition with *she*.
298. *so* = Adv. of Degree mod. *early*.
301. *To tie the silken knots*. Extension of reason *to tremble*.
307. *why* = Interrogative Adverb.

General Paraphrase of '*The Task*' (cont.).

Line 750. The pure and fresh country air and the prospect of the green fields invigorate the citizen who has during the day been breathing the poisoned atmosphere of the city. The man also who is compelled to live in the town takes a pride and pleasure in his patch of garden, surrounded by high walls, although nothing but the hardiest plants can possibly grow there. Yet the few leaves of mint, nightshade, or valerian remind him of what exists elsewhere, and suggest in a feeble way the delicate tints of green with which the country is clad. The longing for flowers and foliage is not confined to the poor, but is exhibited by the rich in the creeping plants with which they decorate their houses, or the window boxes of myrtle, orange, or mignonette. Surely this proves that man, though compelled to reside in dingy towns, still nourishes the inborn craving for the beauty and sweetness exhibited by Nature in the country alone, and, failing to obtain what he would like, endeavours to satisfy himself with any trivial substitute. What is still more striking is the fact that those who are born and bred in towns, and have possibly never seen the country, have the same passion for flowers, and endeavour to cultivate them in old boxes, broken teapots, jars, or any broken utensil that will hold a little mould.

'Comus.'

Line 756. I did not intend to open my lips in this wretched place, but this trickster may possibly think that he can deceive my mind, as he has my eyes, by putting forth pleausible fallacies. I hate at any time to see virtue silent while vice is propounding these ridiculous and cunning arguments against her.

Deceiver, you are entirely wrong in ascribing to Nature the wish to see her children gluttonous with what she has bountifully provided. The profusion of gifts which she bears is intended only for those who deserve them, and who use them rightly and in moderation. If every good man, many of whom are now starving, had a proper share of what is now appropriated and wasted in gluttony and riot by the few, the bounty of Nature would be better appreciated; she would experience no glut of supply, and would undoubtedly receive increased praise. For it is ridiculous to suppose that those who enjoy the greatest share of God's gifts praise Him most; on the contrary, it seems that instead of causing gratitude, wealth leads only to riot and blasphemy. This is surely a sufficient answer to your fallacious arguments.

With regard to the other nauseous plea put forward by you against the beauty and holiness of Chastity, I would say something, but I am doubtful whether my speaking would do good. Your mind is so degraded and debased by your filthy associations that it is entirely out of your power to appreciate in the smallest degree the dignity and worth of true womanly modesty. Nor do you deserve to do so. Your proper fate should be to remain as you are, and wallow in the foul mire, and continue to deceive yourself with your specious arguments and vapid talk.

And yet, if I essayed to put befo.e you in words the truth and holiness of my ideas, the subject would warm me to such a pitch of eloquence that even the brute creation and inanimate nature would sympathise with me, and shew it in such a manner as to crumble your evil erections about your head.

B.—*Arithmetic.* } Work any problems and back questions.
C.—*Music.* }

D.—*Geography.*

Australia.—Physical Features, Climate, Productions, Imports, and Exports.

E.—*History.*

John.

Chief points :—

John's title to the crown.
War with Philip and loss of the French possessions.
Quarrel with the Pope. Interdict and Excommunication.
Magna Charta, Causes and Clauses (most important).
The war which followed.

F.—*Euclid.*

Second Year.—Revise Definitions, Axioms, and Postulates, four deductions per week.

Third Year.—Revise Book I., Props. 30–40, and four deductions per week.

G.—*Algebra.*

Work any back papers.

H.—*Teaching.*

Second Year.—Chapter VII., 'Scholarship School Management.'

Third Year.—Revise Chap. I.–III. 'Scholarship School Management.'

TEST EXAMINATION (Third Quarter).

All Years.

1. *Penmanship* (15 *min.*).

Largehand :—Regularity.

Smallhand :—Hence had the huntress Dian her dread bow.

Geography (1 *hour*).

(Answer Question 1, and *two* others.)

1. Draw a map of the West Coast of England, or the West Coast of Ireland, marking physical features and chief ports.
2. Write five or six lines about four of the following: Dartmoor, Isle of Man, Bog of Allen, Giant's Causeway, Skye, Grampians, Killarney.
3. Give some account of the industries of Wales.
4. In what respects do the people of Ulster differ from those in the rest of Ireland? Why is this? Mention the chief towns in the province.
5. Say what you can of the mineral resources of Canada.
6. What do you understand by the term 'Dominion of Canada?' Answer as fully as you can.

☛ **Owing to pressure on our space we have been obliged to hold over Mr. Flux's paraphrase of Essay on 'Man,' Ep. IV., with Notes on Parsing, Analysis, in addition to his Scholarship Notes on Geography and History. Students of this course may have a copy of these Notes by sending a postcard to the Editor.**

History (1 *hour*).

(Answer *three* questions.)

1. Who was the real Roman conqueror of England? In what parts and at what time was most resistance offered?
2. Why did the Romans abandon Britain? Mention the chief Roman roads, and why they were made.
3. Trace the rise of Wessex to supremacy over the other Saxon kingdoms.
4. Draw a genealogical table shewing the relationship of the Saxon kings, and point when and why there was a deviation from regular hereditary descent.
5. Give a concise account of the Feudal System.
6. Explain clearly the causes of the Civil War in the time of Stephen, the course of events, and the results.

First Year.

English (1 *hour*).

(Answer Question 1, and *two* others.)

1. Analyse the following, and parse words in italics:—

> In these far climes *it* was my lot
> *To meet* the wondrous Michael Scott,
> A *wizard* of *such* dreaded fame,
> *Than when* in Salamanca's cave
> *Him listed* his magic *wand* to *wave*,
> The bells *would* ring in Notre Dame.

2. Explain the following:—shafted oriel, barred aventayle, border foray, the flying jennet, corbells, a palmer's amice, cloister galleries.
3. Explain the force and use of the suffixes in the following words:—lightsome, owlet, porter, ceaseless, tracery, triumphant, wondrous, bristle, holiday, hardihood.
4. Give in your own words the events related in the poem.
5. Explain the terms:—Intransitive, passive voice, infinitive mood, and auxiliary verb, illustrating by quotations from the poem.

Arithmetic (1 *hour*).

(Answer *three* questions, including No. 1 if you can.)

Boys.

1. (*a*) Define a *whole number*, an *even number*, and a *measure*.
(*b*) What is meant by $\frac{5}{6}$. Write the symbol in two other ways, using the figures 5 and 6 each once.
(*c*) Take $\frac{£7\ 10s.}{£15}$ from $\frac{15\ cwt.}{1\ ton}$. How would you answer anyone who says this cannot be done.
2. A pedestal for a statue consists of three square slabs. The top slab, a yard broad, rests on the next, which is a yard and a quarter broad; this rests on a slab a yard and a half broad, which rests on the ground. These slabs form a four-sided staircase, each step being 6 inches high. What will it cost to guild at 5s. per square foot, omitting the upper face of the top slab?
3. Find the value of $1998 \times £'092 + 365 \times 198.\ 11'999d.$, working as shortly as you can.
4. Simplify and express as a decimal:—

$$\left(1+\frac{1}{10+\frac{1}{10}}\right)\times\left(1+\frac{1}{10+\frac{1}{10}}\right)-\left(1-\frac{1}{10-\frac{1}{10}}\right)\left(1-\frac{1}{10-\frac{1}{10}}\right)$$
$$\left(1+\frac{1}{10+\frac{1}{10}}\right)+\left(1-\frac{1}{10-\frac{1}{10}}\right).$$

Girls.

1. (*a*) What is an aliquot part?
(*b*) What aliquot part of an hour is 3 min. 20 sec.?
(*c*) Find by Practice the value of 3 hours 43 min. 20 sec. at £9 9s. per hour.
2. (*a*) Find all the whole numbers of which 222 is the L.C.M., omitting 1 and 222.
(*b*) How can you tell, without working the sum, that
$\frac{9}{10}+\frac{17}{33}+\frac{19}{30}+\frac{27}{41}$ is *not* $=2$.
(*c*) Find the difference between the greatest but one and the least but one of the above fractions.
3. Nine spoons and a fork cost 3s. 6d., five spoons and a fork cost 2s. 9d. Find the price of a fork.
4. A grocer has bought 10,000 lbs. of oranges for £62. A debt of £12 is owing to him by some one who will only be able to pay 6d. in the £. At what price per lb. must he retail the oranges so as to make up this loss, and make a further profit of £82 11s.?

Music (15 *min.*).

(Answer *three* questions.)

1. What other groups of continuous scale tones are separated by the same intervals as

d' t l s : m r d t_1 ; r d t_1 l_1

2. Name the intervals:—

l	f	s	t	l
d	s_1	r	d	r

3. Write over each note and rest in the following its value in pulses and fractions of a pulse:—

| m :-.r:d | s :- :- | d :m :- | .f :r.t_1:d ‖

Second Year.

English (1 *hour*).

(Answer Question 1, and *two* others.)

1. Paraphrase:—

> *'Twere* some excuse
> Did pity of their sufferings warp aside
> His principle, and tempt him into sin
> For their support, so destitute. But they
> Neglected pine at home, *themselves, as more*
> *Exposed than others*, with less scruple made
> His victims, robbed of their defenceless *all*.
> Cruel is all he does. 'Tis quenchless thirst
> Of ruinous ebriety that prompts
> His every action and imbrutes the man.
> Oh for a law to noose the villain's neck
> Who starves his own!

2. Analyse the above passage, and parse words in italics.
3. Give the prefixes and derivations, if you can, of the following words:—unsuspecting, persecutes, simplicity, inveterate, enslaved, incompatible, selected, transports, diversified, supplemental.
4. Give in your own words the causes to which Cowper attributes the decline of the country.
5. Distinguish between adverbs, adverbial phrases, and adverbial clauses, illustrating your answer by quotations from the poem.
6. Explain the following:—Ingenious, parsimony, clouds of Indian fume, Lethean Wave, fell Discord, the Midas finger of the State, Maro, the pipe of Tityrus.

Arithmetic (1 *hour*).

(Answer Question 1, and *two* others.)

Boys.

1. (*a*) Define an average.
(*b*) A is taller than B, and B than C. B's height is nearer to C's than to A's. Show that B's height is below the average of the three.
(*c*) The average age of the children in a class of 20 is 7. By how much per cent. is the average age increased by admitting to the class a boy 10 years old.
2. (*a*) Distinguish between simple interest and compound interest.
(*b*) At what rate per cent. do I receive interest on my whole outlay if I invest £300 in shares standing at 101, and bearing interest at 3 per cent. on the stock, and another £300 in shares standing at 99, and bearing interest at 3 per cent. on the stock. (Neglect brokerage.)
3. How many railway shares at £77 each are equivalent to £50,400 stock at 93½?
4. At what times between 4 and 5 o'clock are the hands of a clock (*a*) coincident, (*b*) at right angles?

Girls (1 *hour*).

(Answer Question 1, and *two* others.)

1. (*a*) Distinguish between prime and composite numbers.
(*b*) Resolve 1560 and 1638 into prime factors, and write down the prime factors of their G.C.M. and L.C.M.
2. A can do a piece of work in $3\frac{1}{2}$ days, and B in $5\frac{1}{2}$ days. They work together for a day, and then A leaves B to finish the work alone. How long will B take to finish it?
3. Reduce $\frac{5}{6}$ of £1 os. 9½d. to the fraction of £1 10s. 10d.; and $3\frac{5}{7}$ weeks to the fraction of 1 day $8\frac{4}{7}$ hours.
4. Find the value of $3\frac{2}{3}$ of 2s. $8\frac{1}{2}$d. $+ 4\frac{1}{5}$ of 7s. $1\frac{1}{2}$d. $- 2\frac{1}{4}$ of 10s. $7\frac{1}{2}$d. $+ \frac{1}{2}$ of 7 guineas.

Euclid (*half-an-hour*).

(Answer *two* questions.)

Boys.

1. Define *straight line, right line.*
The angles which one straight line makes with another on one side of it are either two right angles, or are together equal to two right angles.
What is the hypothesis, and what is the conclusion in this theorem?
2. Any two angles of a triangle are together less than two right angles.
3. Find the centre of a circle that shall pass through two given points, and have a given diameter.

School Management (45 *min.*)

(Answer *two* questions.)

1. What are the chief faults you would expect in children's reading, and how have you been taught to correct them?
2. Give clear rules as to position in writing, and the method of holding the pen.
3. What are the uses of mental arithmetic? Give ten examples of questions suitable to Standard IV.
4. What use would you make of Froebel's Gift 3 (a box of 8 cubes) with an infant's class?

Music (15 *mins.*).

(Answer *three* questions.)

1. Re-write the following passage, making a change to the first sharp key at (*a*), and a return to the original at (*b*):—

(*a*) (*b*)

d m s l s d' fe l s fe d' fe s l s t d

2. Write the following intervals:—Minor sixth above *ray*, augmented or tritone fourth below *me*, perfect fifth above te_1, minor seventh above *doh*.
3. Re-write the following in four-pulse measure, doubling the value of each note:—

| s.l :s | f.,m :m.r | d.d, r:m.,l | s. :d |

Third Year.

English (1 *hour*).

(Answer Question 1, and *two* others.)

1. Paraphrase:—

> Virtue could see to do what virtue *would*
> By her own radiant light, though sun and moon
> *Were* in the flat sea sunk. And *Wisdom's self*
> Oft seeks to sweet retired solitude,
> Where with her best nurse, Contemplation,
> She plumes her feathers, and lets grow her wings,
> That in the various bustle of resort
> Were *all-to ruffled*, and sometimes impaired.
> He that has light within his own clear breast
> May sit in the centre and enjoy bright day.
> But he that hides a dark soul and foul thoughts,
> Benighted walks under the midday sun,
> Himself is his own dungeon.

2. Analyse the first eight lines, and parse words in italics.
3. Give in your own words the contents of this poem.
4. Explain the following phrases and words:—Morrice, sweet queen of parly, swinked hedger, clouted shoon, Nepenthes, to bolt arguments.
5. Write brief notes on the following:—Hecate, Phoebus, Charybdis, Pan, Narcissus, Hebe, Tyrian Cynosure.

Arithmetic (1 *hour*).

(Answer Question 1, and *two* others.)

Boys.

1. (*a*) Explain briefly and simply the use of the Cipher in Arithmetic.
(*b*) Taking as an example 316,457, prove that you get the same remainder whether you divide a number by 9 or divide the sum of its figures by 9.
(*c*) Assuming the above fact, apply it to show that 2345678 × 234567 is *not* 5268307496 26.

2. In what time will £2,675 4s. 2d. amount to £3,036 7s. 2½d. at 6 per cent. per annum simple interest, and what sum would it have amounted to at compound interest in the same time?

3. If a tradesman by selling an article at 8s. 3d. loses 17½ per cent., what should he have sold it for to gain 40 per cent.?

4. Find three numbers which are to one another as 1 : 2 : 3, and such that the sum of their cubes is 4,500.

Girls.

1. Shew, with examples, how you can tell by inspection whether a vulgar fraction will produce a recurring or a terminating decimal. Write down as decimal fractions $\frac{3}{8}$ and $2\frac{7}{11}$.

2. If after paying an income tax of 8d. in the £ a man has £725 a year, how much will he gain yearly when the income tax was lowered to 5d. in the £?

3. A bill of £2 3s. was paid in half-crowns, shillings, and sixpences, and the numbers of the various coins were as 4 : 7 : 9 respectively. How many were there of each kind?

4. Find the cost of papering a room 25 ft. 6 in. long, 6 yds. 2 ft. wide, and 12 ft. high with paper 21 in. wide at 4d. per yard.

School Management (40 *min.*).

(Answer Question 1, and *one* other.)

1. Write notes of a lesson on one of the following subjects :—
(*a*) The St. Lawrence.
(*b*) Fruits.
(*c*) Road-making.
(*d*) Evergreen Trees (Infants).

2. What are some of the objections to simultaneous reading? Show how they may be diminished.

3. In giving a first lesson on the Coast of England, what would you attempt to include, and how would you sustain interest?

4. How would you try to promote Thrift amongst your pupils?

Euclid (40 *min.*).

(Answer *two* questions.)

1. APB, CQD are opposite sides of a parallelogram ABCD. Prove that the sum of the areas of the triangles ACP, PDB, CAQ, QBD is equal to the area of the parallelogram.

2. Two parallel lines AGB, CHD are cut by a straight line PGHQ. Which are the exterior angles, the interior angles, the alternate angles?

3. Parallelograms on equal bases and between same parallels are equal in area.

Algebra (40 *min.*)

(Answer *two* questions.)

1. Give algebraically the rationale of the process for finding the square root in arithmetic, and illustrate clearly by reference to the numbers 289 and 10,609.

2. Find the L.C.M. of

$$x^2 - \frac{8}{3}xy - y^2 \; ; \; \frac{x^2}{3} - 3y^2 \; ; \; x^2 + \frac{10}{3}xy + y^2$$

and the G.C.M. of

$$x^3 + 2x^2 - 4x - 8 \text{ and } 2x^3 + 7x^2 + 4x - 4.$$

3. Solve

(i.) $\frac{1}{4}\left\{\frac{1}{x+3} - \frac{1}{x+7}\right\} = \frac{1}{5}\left\{\frac{1}{x-10} - \frac{1}{x-5}\right\}$

(ii.) $\frac{b}{b-a} - \frac{c^2}{ax} - \frac{c^2}{bx} = \frac{a}{b-a}$.

Music (15 *min.*).

(Answer *three* questions.)

1. Name all the intervals formed by each of the following notes with the others :—

d r f se

2. Write out the following in 4-pulse measure. Begin on a strong pulse :—

| | | |

B.—*Arithmetic.*

First Year.
Boys.—Application of Fraction to Weights and Measures.
Girls.—Compound Practice.

Second Year.
Boys.—Simple Interest.
Girls.—Application of Vulgar Fractions to Money, Weights, and Measures.

Third Year.
Boys.—General Problems on Square and Cubic Measures.
Girls.—Simple Proportion.

C.—*Music.*

First Year.—Accent. Two, three, and four pulse measures.
Second Year.—Six and nine pulse measures.
Third Year.—Relative pitch of keys.

D.—*Geography.*

Norway, Sweden, Denmark, Germany.
This will need very careful preparation. Draw maps for each country. Insert *all* names to be remembered, and go over carefully till known. Pay special attention to Productions, Industries, Towns, and forms of Government.

E.—*History.*

The wars of the Roses. Edward IV., Edward V., and Richard III.
For Notes, etc., see Scholarship Course for last month.

F.—*Euclid.*

Second Year.—Props. 5-8, Book I.
Third Year.—Props. 36-40, Book I., and four deductions per week.

G.—*Algebra.*

Factors. The greatest care should be taken with this, as upon it depends much future work. Everyone should thoroughly understand the application of these formulæ :—

$$(a+b)(a-b) = a^2 - b^2$$
$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$
$$(a^4 + a^2b^2 + b^4) = (a^2 + ab + b^2)(a^2 - ab + b^2).$$

In addition, the rules for finding the factors for trinomial should be mastered.

H.—*Teaching.*

Prepare Notes of Lessons weekly.
Second Year.—Chap. III. Scholarship School Management.

Third Year.—The Teaching of History. Its value as a school subject. Method of Teaching Biographies as a help to the study of History.

TEST QUESTIONS.

1. *Penmanship.*

Largehand :—Generally, Hieroglyphics, Illimitable.
Smallhand :—See Falkland dies, the virtuous and the just !

2. *Composition.*—Write an Essay each week on such subjects as : The influence of printing on mankind—Description of your native place—Life on the sea—Lighthouses, position, structure, and uses—The use of Music in Schools.

3. *English.*—(As the English books set do not average about a line per day, the whole of them must be paraphrased, analysed, and parsed. The notes given above call attention to the chief difficulties, and test papers will be occasionally set ; but it appears to me useless to set passages for each month.)

4. *First Year.*—What do you understand by the Standard Scale of Pitch ? Give the mental effects of **m, f, l, t** and say how they may be modified ?

Second Year.—Re-write the following, making a change to the first flat key at *a* and a return to the original key at *b* :—

(*a*) (*b*)
d m s r f m l ta d' ta s m l s m d

Third Year.—Explain the principle on which the Chromatic tones are named. What are the names of *me* sharp, *ta* sharp, *fah* flat, *doh* flat ?

5. Give the chief vegetable productions of the South of Europe, and point out places specially noted for the cultivation of the vine.

6. In what parts of Europe are gold, silver, iron, and coal found ?

7. Construct a table showing the relations of the various races of Europe to each other, and point out if you can the order of their settlement in Europe.

8. What are the chief industries of France. What towns (if any) are specially connected with each ?

9. Describe, with sketch map, a coasting voyage from Calais to Bordeaux.

10. Discuss Henry IV.'s right to the throne, and the results of his accession.

11. Describe Henry V.'s conquest of France.

12. What do you know of Joan of Arc ?

13. What is meant by the terms : Induction, Deduction, Intuition, Analysis, and Synthesis, as applied to teaching ?

14. Explain your method of teaching the common definitions in Geography.

SCHOLARSHIP COURSE FOR DECEMBER, 1898.

1. *Reading.*—Ten minutes' oral practice per diem, and as much general reading as possible.

2. *Repetition.*—This should now be known, and should be repeated orally at least once a week. Take care that all meanings are ready, and have a good general idea of the whole work from which the lines are taken.

3. *Penmanship.*—Ten minutes' practice per diem from a good model.

N.B.—(I must impress upon all students the utmost necessity of this. The majority of the specimens sent up to me show that there is absolutely no style copied, no regulations as to size and spacing, and often very little care. As the subject is highly marked, this is a suicidal policy.)

4. *Composition.*—Write one or two essays per week, selecting from the following :—

(*a*) A Rolling Stone gathers no Moss.
(*b*) Instinct in Animals.
(*c*) Signs of Spring.
(*d*) Smuggling.
(*e*) Flowers.
(*f*) The difference between poetry and prose.
(*g*) The Dignity of Labour.
(*h*) Night.

Students must be particular to plan out the Essay before Writing. If this is not done, it results in the greatest confusion of ideas. It is a most important subject, as it appears in all written work.

5. *English.*
(1) The Adverb. Definition, Classification, Syntax, Comparison.
(2) Learn 20 roots per week from a good list.
(3) Literature from the Restoration to 1700.
Chief writers : Dryden, Waller, Milton, Pepys, Evelyn, Jeremy Taylor, Bunyan, Baxter, Samuel Butler, Hyde.
The period of French influence when 'the stately tongue of England learned to dance the minuet of France.' Iambic Pentameter of rhyming couplets became the common form of poetry, while the drama affected the 'Three Unities,' which demanded that in a drama there should be (1) unity of place—no change of scene. (2) unity of time—the action to be contained in twenty-four hours, (3) unity of action—one tale or plot only. It will be noticed that few if any of Shakespeare's plays agree with these conditions.

6. *Arithmetic.*—Proportion and Division into proportional parts.

7. *Algebra.*—Quadratic Equations.

8. *Euclid.*—Revise Book I. Definitions, Axioms, Postulates, and Props. 1–10, with 10 deductions per week.

9. *Geography.*
(*a*) Cape Colony and Possessions in South Africa.
(*b*) Revise Asia Minor, Persia, Arabia, Afghanistan, Beloochistan, and the Central States.

10. History. The Tudors. Henry VII. Elizabeth.

11. *Teaching.*—Chap. V., Scholarship School Management.

12. *Needlework.*—See notes in another column.

13. *Domestic Economy.*—Washing and general revision of 'clothing.'

14. *Music.*—Chap. V. 'School Music Teacher.'

15. *French.*—Chap. V. 'Philosophe sous les Toits.' Use the PRACTICAL TEACHER edition.

Test Questions.

1. Write as specimens of copysetting :—

(*a*) Largehand—Symbolistic, Tracheotomy, Undenominational.

(*b*) Smallhand—

Not wholly in the busy world, nor quite
Beyond it, blooms the garden that I love.

2. Analyse the following passages, and parse words in italics :—

(*a*) In conclusion he observed that *although* he *could* not *allow* of the style *calling* their *privileges* an undoubted right and *inheritance*, but could *rather* have wished that they had said their privileges were derived from the grace and permission of his ancestors and *himself* (*for* most of them had grown from precedent, which rather shows a toleration *than inheritance*), yet he gave them his royal assurance that, *as long* as they continued *themselves* within the limits of their duty, he would be as careful *to maintain* their lawful liberties and privileges as he would his *own* prerogative, *so* that their House *did* not *touch* on that prerogative which would enforce him or any just king *to retrench* their privileges.

(*b*) *He* who *grown aged* in this world of woe,
In deeds, not years, piercing the depths of life,
So that *no* wonder waits him; nor *below*
Can love or sorrow, fame, ambition, strife,
Cut to his heart *again* with the keen knife
Of silent, sharp endurance: he *can tell*
Why thought seeks refuge in lone caves, *yet rife*
With airy images and shapes which dwell
Still, *unimpaired though* old, in the soul's haunted cell.

(*c*) Cowards die *many times* before their deaths;
The *valiant* never taste of death *but once*.
Of all the wonders that I *yet* have heard,
It seems to me most *strange* that men should fear
Seeing that death, a necessary *end*,
Will come when it *will* come.

(*d*) *There* is no vice that doth *so* cover a man with shame *as to be found false* and perfidious; and therefore Montaigne saith prettily when he inquired the reason *why* the word of the lie should be *such* a disgrace and such an odious charge: saith he, 'If it *be* well weighed *to say* that a man lieth, is *as* much as *to say* that he is brave towards God and a coward towards man; *for* a lie faces God and shrinks from man.'

3. TEST PAPER IN PERCENTAGES :—

(1) A cask which holds 20 gallons is filled with 15 gallons of brandy and 5 of water. 4 gallons of the mixture are then drawn off and the cask filled with water. Find the percentage of brandy in the second mixture. Ans. 60.

(2) A man added 20 per cent. to his capital each year, and in 4 years it amounted to £5,184. What was his capital at first? Ans. £2,500.

(3) If $\frac{7}{15}$ of an estate be worth 200 guineas, and the value of the estate be increased ·075 per cent. by improvements, find the value of $\frac{2}{45}$ of the improved estate. Ans. £240 4s. $2\frac{2}{3}$d.

(4) For what sum should a ship worth £7,250 be insured at £3 6s. 8d. per cent., so that the owner might recover, in case of loss, the value of the ship and insurance. Ans. £7500.

(5) A tradesman's prices are 20 per cent. above cost price, and he allows a customer 10 per cent. on his bill. What profit does he make? Ans. 8 per cent.

(6) A man speculated with £1,000 and gained 10 per cent.; speculated again with the amount and lost 10 per cent.; again speculated and gained 10 per cent. and then lost 10 per cent. How much was he then worth? Ans. £980 2s.

(7) An ironmonger bought nails at 18s. 6d. per cwt. and sold them at 3d. per lb. What did he gain or lose per cent.? Ans. $51\frac{43}{47}$.

4. Draw a memory map of the West Coast of Ireland.

5. Give a full account of the industries of New Zealand.

6. Mention 10 towns in Holland and Belgium, and give (*a*) their position, (*b*) their relative size, (*c*) the industries, manufactures, etc., connected with them, and (*d*) anything of historical importance about them.

7. Say what you can of the rise of the power of the Commons under the Lancastrian kings.

8. Explain clearly the causes and results of the Wars of the Roses.

9. What are the chief systems of teaching to read?

10. Point out some unhygienic habits in modern dress.

11. Write notes of a lesson on Roots of Plants, Simple Interest, or Thrift.

12. Name the intervals made by each of the following notes with the others :—**n ae l r.**

CORRESPONDENCE.

RULES AS USUAL.

All communications and queries with regard to the PUPIL TEACHERS' AND SCHOLARSHIP COURSE should be addressed to 'A. T. FLUX, The Bays, Belvedere, Kent.'

ANSWERS TO CORRESPONDENTS.

Dorothy.—Penmanship 30/60. Very poor, destitute of any regular style. Practise from a good model.

M. E. J.—You will find the information you want in Whittaker. That is the only reliable source I know.

Marian.—55/60. E.R. 50/60. Not oval enough.

Nebulus.—45/60. Loops not long enough—more care in details of letters needed.

Ellam.—Essay 50/60. Well written and well expressed.

Chivalry.—Essay 50/60. Too long an introduction. Penmanship 58/60.

Grit.—Essay 50/60. Good. Original thought rather than historical facts needed.

(*Other Correspondents answered by post.*)

OUR 1898 CERTIFICATE CLASS.

BY J. C. HOROBIN, M.A.,
Principal, Cavendish College, Cambridge.

The Examination for Certificates will commence on Monday, 11th July 1898, at 2 p.m.

The general conditions for candidates are to be found in Articles 55–64 and 116–121 of the current Code.

SOME QUESTIONS ON THE THEORY OF TEACHING AND NOTES THEREON.

1. Distinguish carefully the 'actions' which manifest 'will' from others which do not.

Movements may be classified as random, reflex, instinctive, those present *in* and *to* consciousness.

Random actions are spontaneous and unconscious. They are exemplified in simple cells, amveba, and very young infants. There is in no sense a response to external stimulus.

Reflex movements are the 'immediate response to stimulus.' They are exemplified in gripping, sucking, blinking, etc., by infants.

Instinctive movements are largely reflex, but consciousness plays a more active detective part. The antecedent condition shows elementary desire, with discomfort if the movements do not take place, and in the movements successfully completed there is evidence usually of elementary co-ordination of several powers to a definite purpose. Crying, smiling, standing, locomotion, play, etc., are probably instinctive.

The foregoing are examples of the involuntary actions which, not involving deliberation and will, being impulsive and opposed to will, do not come under moral judgment, though they are of immense importance to the teacher as the mode of infant ideation.

In an act of will there is 'conscious purpose,' the subject knows '*what it is doing*.'

Perception, craving, muscular ideation and co-ordination, movements to satisfy, are the steps in an act of will.

2. What do you understand by desire, appetite, wish, motive, intention?

Sully defines desire as 'the outgoing of the mind in an active impulse or movement towards the realisation of the idea, or representation of something pleasurable.'

It involves :

(1) An idea of '*that* which is desired.'

(2) Feeling so agreeable as to lead to the consciousness that realisation may be greater than idea.

(3) A state of tension culminating in striving to attain.

The teacher must carefully note that desires vary in strength not so much by intrinsic variation as by proximity of attainment.

Appetites are periodic organic cravings, such as hunger, thirst, etc. Desire is greater than appetite, involving purpose consciousness.

A wish is a nascent desire. Unattainable things may be wished for, but the lack of the element of belief in power to satisfy the wish prevents development into desire.

Desire has its basis in the interest aroused by feeling.

Motive is the spring of volition, probably arising jointly from feeling and ideas.

Whewell classifies motives as :

(1) Appetite.
(2) Affections.
(3) Intellect and desires.
(4) Moral sentiments of right and wrong.
(5) Reflex sentiments connected with self, such as desire for esteem, admiration, etc.

Intention differs from motive in extension, though often used synonymously.

Motive is the stimulus to an action ; intention is the end to be attained by the action.

Thus in discipline the motive is the formation of character ; but the intention may involve pain infliction as well as pleasurable arrangements.

3. What do you understand by the phrase—'Children are creatures of impulse.'

Usually more than one impulse to action is active, and the indecision so caused is settled by deliberation and acceptance of one of the alternatives. This involves control as against present powerful stimulus so as to weigh possible consequences. But this power of control is dependent upon ideas and feelings acquired or developed by experience. The experience children cannot have obtained, therefore the tendency to yield immediately to impulse.

It is necessary for the teacher specially to note that control manifests itself in three main directions : (1) movements ; (2) thoughts in order of difficulty to the child ; (3) feelings. Moral self control involves all three, and no disciplinary system approaches the ideal which does not give ample opportunity to practise the teacher and pupil in each and all of these directions.

4. What do you understand by habit, and how is it related to character ?

Habit is an acquired tendency to repeat a certain sequence of ideas or actions.

The facility resulting from exercise has its mechanical analogue in the diminution in force required to move machinery after the friction due to mechanical roughness has been reduced by wearing, but there is no analogue to the action of the lubricant in the mental phenomena. Caution should be used in speaking of the mind as plastic, implying the power of a teacher to mould as the potter does clay. The true view is that children are born with powers and tendencies, and the function of the teacher is to regulate and guide conduct so as to make the law of habit a factor in securing the ideal desired. Further, it must be noted that the law in question in excess produces mechanical acquiescence, reducing morality to the level of automatic movements. True education produces such a condition as to leave perfect freedom of choice in the pupil. In this view 'habits' are the milestones on the road of development. The finished product is character, that disposition which is the habitual expression of the man. Character is not constant, but progressive or regressive.

The exemplification of character is action ; the factors of variation are thoughts, feelings, and acts.

Character is the resultant of innate determinism and environment.

The teacher's function is in the modification and arrangement of the latter.

5. Classify 'emotional states,' and contrast pleasure and pain.

Fear is either a definite apprehension of a known thing or state, or a vague dread of an undefined thing or state.

Anger, which, according to Darwin, is manifested in the fourth or fifth month. It is distinguishable from fear by the following marks :—

Anger results from present or past experience.
Fear results from dreaded future experience.
Anger has a modicum of pleasure.
Fear is painful to an extraordinary degree.
Anger excites and leads to energetic muscular activity.
Fear depresses and paralyses.

Love of activity, or self assertiveness, the indication of will power.

Love of approbation, with its contrast, fear of disgrace and shame.

Sympathy, first manifesting itself in imitative reflection, followed by *pity*, developing into affection and esteem.

Plato defined pleasure as the 'satisfaction of a want. Aristotle as 'the consciousness of perfect or unimpeded activity.'

The latter view is accepted in different forms by most modern philosophers.

Pain would result from the opposite conditions, but so multiform are the modes of the phenomena that no definition has yet been found to cover them all.

6. Discuss the relation of child and teacher in the sphere of morals.

It has been argued that the child is born bad, and becomes better ; that it is to imperfect, and becomes worse, but probably the more accurate view is that the child is neither good nor bad, since the necessary will power to give motive for conduct is not developed.

The child early shows anger, envy, and cruelty, though some acts called cruel arise from other motives, such as curiosity and love of activity ; whilst on the other hand, children are distinctly sociable, and their general kindness to animals, and affection for toys, show the germs of sympathy. There are also indications of an instinctive tendency to follow rules and precedents, which is an important apellant power in education.

Regularity as a check to impulse is the most important of the early moral forces.

The school is secondary to the family by virtue of the priority, continuity, and duration of the latter, but being more analogous to the society of the world at large, with the consequent subordination of the self to the community, there is more opportunity for the practice of moral powers, whilst being equally adapted for the teaching of moral duties.

From this it follows that the child is capable of recognising law and authority, especially in its concrete form, in the relation to the parent or house master, and afterwards to the teacher or schoolmaster.

But this requires that the teacher's commands shall be reasonable and consistent, free from caprice, passion, desire for popularity, and his government impartial and unobtrusive.

Pas trop gouverner is as good a maxim in the school as in the state.

Having regard to the universality of imitation in children, the acts of the teacher indicative of his personality and character, are the most potent influence in moulding the characters of the taught.

The teacher's influence is measured as much by what he *is* as by his *maxims* and *doings*. The child recognising the mental and moral superiority of the teacher is in the attitude readily to respond by submission to this authority.

This rational obedience is the aim of school moral education, and anything short of it marks the insulation of the child from the teacher, either by lack of moral determinism on the part of the child, or of morality in the teacher.

7. What do you understand by discipline ?

Philologically discipline (*discipulus*) means the same as training and education, but usually it means the maintenance of authority.

The great aim should be the training of the will of the pupil so that undue severity or tyranny, equally with the bribery of rewards, are out of place, since the one crushes the self, the other makes it simply pleasure-loving, that is, the motive to action is external instead of internal.

Rousseau's system of discipline by consequences has, according to Spencer, the advantage of the child obtaining personal experience of penalties resulting directly from wrong actions without the disturbance of temper resulting from the penalties being imposed by mere authority.

But it may be objected that nature does not always react in the same manner or degree, that the reaction is often so delayed, that the particular act is gone out of consciousness, and the vice become a habit, and more important still, the system is purely physical, and one of expediency and consequences instead of depending on the inward sense of right and moral fitness the proper basis of a disciplinary system.

Authority involves power to punish, but the punishment should be not only retributive and deterrent, but ameliorative. In other words, the infliction of pain is only justified as one of the methods of reducing and finally abolishing it from the system.

Bentham has enunciated certain principles which ought to regulate punishment.

(1) The punishment should clearly outweigh any possible advantage to be gained from the offence.

(2) The punishment should be graded with reference not only to the nature of the offence, and the resultant mischief, but also to the sensibility of the offender and the uncertainty of detection.

Most of the objections to corporal punishment are based upon its abuse, and quantity, and mode.

Given a perfect cradle and nursery training, and perfect teachers, corporal punishment is unnecessary and out of place; but having regard to the varying conditions of previous training, and the general environment and necessities of the ordinary school, most educators agree that it is a painful necessity, but it should be always remembered that maximum good is obtained by minimum use.

The system of rewards, whether intangible or in kind, is based on the material and sensual nature of the child's world.

But unless judiciously used to lead up to the pure satisfaction of well doing, rewards are mere bribes, and not moral agents at all.

SYLLABUS OF WORK FOR THE MONTH.

FIRST YEAR.

School Management.

1. Occupations—Object Lessons—(Difference and place in curriculum).
2. Diagrammatic methods in Arithmetic.
3. Drawing and methods of teaching—Penmanship.
4. Reading methods—Dictation.

Composition.

1. Rules of Syntax and exemplifications.
2. 'Thrift.'
3. As (1).
4. Code Regulations on Composition.

Arithmetic.

Not less than six examples from miscellaneous sets ought to be worked per week, as well as some on the particular work set and the examination questions given.

1. Theory of Numeration and Notation.
2. H.C.F.—Discount.
3. Averages—Proof $AB = BA$; $\frac{a}{b} \times c = \frac{ac}{b}$.
4. Compound Interest—L.C.M.

Music.

1. Intervals and methods of measuring—Metronome.
2. Pulses and their Subdivisions.
3. Key Signatures—Bridge notes.
4. Mental Effects—Musical Terms.

English.

1. Strong and weak Verbs and their history.
2. Adverbs—comparison of—history of.
3. Metre—Rules of punctuation.
4. Relative and Possessive Pronouns—their history.

Literature.

1. Lamb—Grace before Meat—Ears.
   Wordsworth. Duty—Dora—Tintern Abbey.
2. Lamb—Old Benchers—New Year's Eve.
   Wordsworth. Lycoris—Nutting—Cumberland Beggar.
3. Lamb—Modern Gallantry—Witches.
   Wordsworth. Laodameia—Joanna.
4. Lamb—Valentine's Day—Imperfect Sympathies.
   Wordsworth. Immortality—Fir Grove—Stanzas (Castle of Indolence).

Geography.

1. Ethnography of Europe.
2. Belgium—Denmark—Portugal.
3. The Lake Systems of Europe—Norway and Sweden.
4. Waterways of Europe.

History.

1. Henry VIII.—Langton, Laud, Howard.
2. William IV.—Warwick, Sydney, Wolfe.
3. Edward III.—Alford, Drake, Blake, Nelson.
4. James I.—Tyler, Hampden, Cooper.

MEN ONLY.

Algebra.

1. Proof of Rule for Multiplication of Fractions — Simple Equations.
2. Square Root—Problems in Simple Equations.
3. Arithmetic Progressions—Simultaneous Equations.
4. As (3).

Geometry.

1. Book I.—14, 18, 26.
   ,, II.—1, 12.
   ,, III.—23, 6.
2. Book I.—15, 19, 24.
   ,, II.—2, 10.
   ,, III.—4, 29.
3. Practise riders (not less than 3 per day) on Book II.
4. As (3) for Book III.—Revise Definitions of Books I.–III.

WOMEN ONLY.

Needlework.

Practise cutting parts of patterns with varied scale.
Gathering and stroking and setting in.

Domestic Economy.

1. Diet—Chemistry of Food Stuffs.
2. Ironing—Materials for Clothing.
3. Air—Ventilation.
4. Artificial lighting—Furniture.

OR,

Geometry.

Revise Definitions, Propositions 4, 8, 14, 18, 24, 26.

SECOND YEAR.

Composition.
Music.
Arithmetic.
Geography.
Needlework.
} As First Year.

School Management.

1. Instructions to H.M.I.
2. Practise making T.T. with given Staff.
3. Notes on Theory Questions.
4. As (2)—Association—Conception—Fallacies.

N.B.—Some time should be given to the revision of the latter end of Fitch.

English.

Grammar and Wordsworth as First Year.

1. M.N.D.—Sketch of Plot.
   Hamlet—Rhyme and incomplete lines.
2. M.N.D.—The Supernatural in the Play.
   Hamlet—Scansion, especially irregular examples.
3. M.N.D.—Principal Characters.
   Hamlet—Classical Allusions in the Play.
4. M.N.D.—Read carefully the Introduction.
   Hamlet—Special characteristics of Shakespeare's genius in the Play.

History.

The Governments of Pitt, Aberdeen, Palmerston.

MEN ONLY.

Algebra.

As First Year each week.

1. Proof of B.T.
2. Logs—Variation.
3. H.P.—Annuities.
4. Discount—Permutations.

Geometry.

As First Year each week.

1. Practise riders on Book VI. (not less than 3 per day).
2. Revise the odd numbers of Book IV. and practise riders on the same.
3. As (1).
4. Revise the even numbers of Book IV., etc.

WOMEN ONLY.

Domestic Economy.

N.B.—Students should get Nelson's Revised Domestic Economy.
As First Year each week.

1. Theory of Cooking—Eggs—Cost of Menus.
2. Feeding the Sick—Liquid Foods.
3. Cleaning, disinfection and disinfectants.
4. Modes of making small investments—Specific incomes, and the administration thereof.

OR,

Geometry.

As First Year.
Also Props. 27, 29, 31, 33, 35, 37, 39.

QUESTIONS FOR TESTS, ETC.

FIRST YEAR.

Penmanship.

Write in large and text hand, 'Exuberant Verbosity,' and in small hand 'Man never is but always to be blessed.'

School Management.

1. Compare the relative merits of the Look and Say and the Phonic methods of teaching Reading.
2. Draw up rules for a Pupil Teacher for a Dictation Lesson.

Composition.

Write a short essay on :—
(1) Thrift.
(2) Plain Prose.

Arithmetic.

1. A grocer mixes 40 lbs. of tea at 2s. 5d. per lb., 27 lbs. at 3s. 2d., and 25 lbs. at 1s. 9d. At what price per lb. must he sell the mixture so as to gain £2 6s. 3d. ?

2. What sum of money will amount to £2884 6s. 5½d. in 2 years at 3% Compound Interest ?

3. The soldiers in a barracks can be arrayed in rows of 15, 20, 25, or 35. How many are there ?

Music.

1. Draw a Modulator, showing the first remove keys sharp and flat.

2. Write six measures of time tests for Division IV., showing each subdivision of pulse with rests required.

English.

1. Write a short account of the history of Adverbial Inflexion.
2. Analyse Duty, Stanza I., and parse Daughter, Duty, who, erring, thou, dost, free.

3. Analyse the last paragraph in Valentine's Day, and comment upon *anile, hag, subpœna, husks, gorgons, forspent, horologue, marvell, cravats.*

Geography.

1. Draw a map of Europe, inserting with names the lakes and the ethnographical divisions.

2. Write a short account of the canals of Europe.

History.

1. Write an account of the changes in the relations of Church and State in the reigns of Henry VIII.—James I.—Victoria.

2. Write a short account of Drake, Blake and Nelson.

SECOND YEAR.

Penmanship.
Geography.
Music.
Arithmetic.
Composition.
} As First Year.

English.

Grammar and Wordsworth as First Year.

1. Give the meaning and derviations of quintessence, pioneer, posset, for the nonce, gyves, hand-saw, caviare, blazon, bisson, batten.

2. Write an essay on the character of Hamlet, with special reference to his madness (real or feigned).

School Management.

1. Draw up a table, showing the code requirements for the staffing of schools with averages of 30 to 200.

2. Make a time table for an Infant School with an average attendance of 150, showing specially how you would arrange when the Pupil Teachers were engaged in study.

History.

1. Write an account of the origin, events, and results of the opium war.

2. Give an account of the condition of the masses of the nation previous to, and the agitation which culminated in the Repeal of the Corn Laws.

WOMEN ONLY.

Needlework.

First and Second Year.

On the calico supplied show not less than 3 inches of seaming, felling, hemming, gathering and setting in, work a buttonhole, and stitch on a linen button.

Domestic Economy.

First Year.

1. Explain each of the following terms :
Mastication, fibrin, glucose, soft water, butter milk, curd, antidote, farinaceous, aperient.
2. How would you iron a shirt ?

OR

Geometry.

1. Define straight line, superfices, square, trapezium, and write out axioms 3, 7.
2. Prove Props. 8 and 26.

SECOND YEAR.

1. How and to what extent can small savers invest in Consols ?
2. A household consists of 2 adults and 3 children, with a weekly income of 30s. Draw up a scheme of expenditure.

OR

Geometry.

1. As First Year.
2. Prove Props. 35, 41, 47.

MEN ONLY.

Algebra.

FIRST YEAR.

1. Solve (*a*) $\frac{1}{x-3} - \frac{1}{x-1} = \frac{1}{40}$,

(*b*) $\frac{x}{2} + \frac{2}{y} = \frac{5}{4}$,

$\frac{x}{3} + \frac{3}{y} = \frac{5}{3}$.

2. Prove $a^{-m} = \frac{1}{a^m}$ and $a^0 = 1$.

SECOND YEAR.

1 and 2 as First Year.

3. Define Mantissa, and characteristic.
Prove $\log_a c = \log_a b \times \log_b c$.

4. Assuming that the co-efficient of x^r in the expansion of

$$(1 + x)^n \text{ is } \frac{\lfloor n}{\lfloor r \lfloor n - r},$$

find the co-efficient of x^r in the expansion of $(1 + x)^{n+1}$. Write down the first three and the middle terms of the expansion of $\left(\frac{x}{a} + \frac{a}{x}\right)^{2n}$.

Geometry.

FIRST YEAR.

1. The tangents that can be drawn from an external point to a circle are equal to each other.
2. In the same circle equal arcs are subtended by equal straight lines.
3. If through an end of a chord of a circle a straight line be drawn making angles with the chord equal to the angles in the alternate segments, this straight line shall be a tangent to the circle.

SECOND YEAR.

1, 2 and 3 as First Year.

4. Find a point equidistant from three given points not in the same straight line.

BLACKBOARD ILLUSTRATIONS

will be found month by month in 'The Practical Teacher's Art Monthly.'

LONDON MATRICULATION.

June 1898.

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LATIN.

Before giving the last words of advice, may we offer all our readers best wishes for their success and a First Class in the Matriculation? From now to the Examination they cannot do better than revise the typical sentences we have worked out, carefully noting the reason for each construction and the idiomatic differences between English and Latin. A candidate cannot do better than run over 30 or 40 sentences on the morning of the Examination; not trying, however, to 'cram' the sentences, but digesting each individual phrase. In the examination, if a candidate meets a phrase or expression new to him, he should try to turn or twist it into a form which he can express in Latin. An approximate rendering is better than a blank or a coined word or phrase.

The Grammar notes should also be revised. Below we have given three papers on Vergil which our readers should carefully work through, and if there are any of the questions which they cannot tackle, we shall be pleased to help them on receipt of a stamped envelope for reply. We have also given below a list of most of the important nouns.

Solution of Sentences given last month.

1. Si eum quid in hoc tanto discrimine facturus fuerit rogavisses, tibi dicere non potuit.
2. Si Romam ivisset nec patrem certiorem fecisset eum culpavissem.
3. Ante diem sextum Idus Martias anno ab urbe condita sexagentesimo nonagesimo nono frater eius Roma profectus Capuam ante diem tertium Idus Martias pervenit.
4. Non dubium esse potest quin heres patri ex semisse factus sit.
5. Si eum quot bis bina sint roges, tibi dicere nolit.
6. Cum urbem Nonis Aprilibus ab hostibus incensam audivisset milites convocatos ut quam celerrime ad amicos suos ulciscendos contenderent est hortatus.
7. Alii Romam se ire posse, alii se ituros etiam si possent negaverunt.
8. Non dubitari potest quin fortior fuerit quam qui amicos desereret cum urbem hostes oppugnarent.
9. Eum prohibere debemus quominus sibi amicos suos anteponat.
10. Utrum Romam an Capuam iverit tibi non dicere possumus. Eum non Deli esse scimus.

Typical Sentences.

(37) Up to this Brutus never let a day pass without informing his friend of what had happened in the war.

Nullum adhuc diem Brutus intermisit quin amicum quid in bello accidisset certiorem faceret.

Notes.—(*a*) 'Without' and a verbal noun after a negative clause expressed by *quis* and subjunctive, as explained in previous sentences.

(*b*) *Accidisset* is subjunctive in a dependent question.

(*c*) *Certiorem* agrees with *amicum*, the object of *faceret*.

38. In that revolt they had sinned past forgiveness.

Maiora in ea defectione deliquerant quam quibus ignosci posset.

Notes.—(*a*) *Past forgiveness* cannot be translated literally into Latin. You must look and see what *past forgiveness* means, and turn the phrase into simple English. To '*sin past forgiveness*' is equivalent to 'to commit sins too great to be forgiven' (*i.e.* greater than which can be forgiven). Now where we use a verb and a noun with an adjective of like 'to make many promises,' the Latins often use a verb and a neuter plural adjective, *multa polliceri*, 'to make many promises,' so to commit greater sins, to '*delinquere maiora.*' 'Too' followed by an adjective and an infinitive is expressed by the comparative of the adjective, *quam qui* (varying according to gender) and the subjunctive.

(*b*) A beginner now may say, Why write 'quam quibus ignosci posset'; why not write 'quam quae ignosci possent'? The reason is this: *Ignosco* governs the dative, and is therefore an intransitive verb, and cannot be used personally in the passive. Hence in Latin we have to use an expression the literal translation of which is, 'to which it could be pardoned.'

(39) Those boys deserve to have their books taken from them.

Illi pueri digni sunt quibus libri adimantur.

Notes.—(*a*) *Dignus* is never in prose followed by the infinitive. *Qui* and the subjunctive must be used. *Indignus* requires the same construction. If *dignus* and *indignus* are followed by a noun in Latin the noun will be in the ablative, not in the genitive case.

(*b*) The literal translation of the sentence given above is, 'These boys are worthy from whom the books should be taken.' Verbs of taking away, as *adimo*, *aufero*, require either the dat. or abl. (with *ab*) of the person from whom anything is taken away. The subjunctive is due to the fact that *qui* is *consecutive* (= 'such a kind that').

Important Nouns.

Among the most important are the following:—canis, senex, iusiurandum, supellex, (no pl.) bos, Juppiter, mater linter, ilex, accipiter, auceps, mos, strix, nox, nix, lis, obses, requies, tellus, dolor, flos, seges, cassis, capis, cucumis, mus, lepus, dedecus, decus, hiemps, servitus, flamen, pecten, sus, cor, interpres, gryps, Thetis, elephas, lynx, Arcas, echo, tussis, vis, imber, os, vas, (2) iugerum, tigris, palus, (2) vates, aries, cicatrix, crus, classis, pondus, pes, compes, iecur, iubar, cupido, dos, incus, olus, caro, iter, Aquilo, as, aer, tibicen, pectus, mos, pulvis, ver, lac, lapis, nex, scelus, volnus, semis, carbasus, merces, merx, sitis, mel, haruspex, papaver, calx, rete, Sappho, pecus, (2) nex, nux, pugio, robur, teges, senectus, vomer, ros, vervex, cornix, Macedo, chlamys, auspes, cucpis, femur, fenus, cos, dedecus, pumex, trames, securis, paries, comes, sacerdos, poples, cubile, messis, amussis, turbo, crater, poema, viscera, Tyndaris, civitas, cruor, nubes, salix, hirundo, iuvenis, caespes, grus, certamen, genus, tuber, mas, Neapolis, turris, vellus, obex, aetas, cinis, tus, far, caput, pollex, stirps, anas, pavo, domus, laurus, vulgus, virus, pelagus, rastrum, locus, Idus, meridies, dies, dea, filia, equa.

Test Paper, Vergil, Book I.

1. Translate:—
   (*a*) 210–215.
   (*b*) 393–401.
   (*c*) 421–449.
   (*d*) 701–706.
   (*e*) 157–175.
   (*f*) 102–120.
   (*g*) 596–610.

2. Translate and comment on:—*laticum libavit honorem; falsi inplevit genitoris amorem; flammis adolere Penatis; sponda; magalia; haud tanto cessabit cardine rerum; ut Aeneas iactetur nota tibi; magnorum horrentia terga suum; quae me cunque vocant terrae; animum arrecti dictis; humeros deo similis; erumpere nubem ardebant; urbem quam statuo vestra est; quis nesciat Troiae urbem; rex erat Aeneas nobis, quo iustior alter, nec pietate fuit nec bello maior et armis; quos turba alias avexerat oras instans operi regnisque futuris; peplus; artificum manus inter se; templum donis opulentum et numine divom; neque cernitur ulli; laetissimus umbrae; miratur strata viarum; tum celerare fugam suadet; vox hominem sonat; ambages; nodo que sinus collecta fluenti.; dederatque comam diffundere ventis; uno graditur comitatus Achate; laquearia; funalia; in convexo nemorum; remigio alarum; cui nunc cognomen Ulo additur; parce metu; urbem Patavi; implentur veteris Bacchi; pars in frusta secant; gaza; tibi mulcere dedit fluctus.*

3. What is the historical allusion in (*a*) *dirae ferro et compagibus artis claudentur Belli portae?* How often did this occur? (*b*) *cum domus Assaraci Phthiam clarusque Mycenas servitio premet.*

4. Account for the moods in (*a*) *nascetur Caesar famam qui terminet astris;* (*b*) *forsan et haec olim meminisse iuvabit;* (*c*) *nec prius absistet quam septem corpora fundat humi;* (*d*) *haud invisus auras carpis qui Syriano adveneris urbem;* (*e*) *videbat ut fugerent Graii;* (*f*) *miratur quae fortuna sit urbi.*

5. Comment on the grammar and construction of—(*a*) *prospectum petit Anthea si quem videat;* (*b*) *oculos suffusa nitentis;* (*c*) *Ilus erat dum res stetit Ilia regno;* (*d*) *Maia genitum;* (*e*) *mene incepto desistere victam;* (*f*) *vix septem Euro supersunt;* (*g*) *facilem victu gentem;* (*h*) *donis opulentum et numine divae;* (*i*) *puer impar congressus Achilli;* (*j*) *tunsae pectora palmis.*

6. Parse *accesstis, querentem, conscere, sertis, tunsae, populare.*

7. Distinguish—nītentis, nĭtentis; plāga and plăga; nōtus and nŏtus; cānis and cănis; redūces and redŭces; păret and pāret.

8. Give instances of Vergil's love of Inversion.

9. Quote Archaeisms, Poetical Constructions, and Graecisms from Virgil.

10. Explain and quote instances of aposiopesis—hypallage—zeugma—tmesis—spondaic line—synzesis.

11. Why was Aeneas called *pius?*

12. Write Geographical notes on—*Cynthus, Eurotis, Mycenae, Patavium, Cythera, Idalia.*

13. Discuss and give the meaning of—(*a*) *stringere remos*; (*b*) *si datur Italiam tendere*; (*c*) *caesaries*; (*d*) *reliquias Danaum*; (*e*) *sunt lacrimae rerum et mentem mortalia tangunt*; (*f*) *hac demum voluit consistere terra*; (*g*) *monile bacatum*; (*h*) *tela Typhoia temnis*; (*i*) *haud tanto cessabit cardine rerum*; (*j*) *faciem illius falle dolo noctem non amplius unam*; (*k*) *quibus ordine longam cura penum struere et flammis adolere Penatis*; (*l*) *puero donisque movetur*; (*m*) *memor matris Acedaliae*; (*n*) *vina coronant*; (*o*) *libato summo tenus attigit ore*; (*p*) *pleno se proluit auro*; (*q*) *rapidum praemittit Achaten Ascanio ferat haec*; (*r*) *indicium Paridis et Spretae iniuria formae*; (*s*) *prora avertit.*

Test Paper, Vergil, Book II., lines 1–400.

1. Translate— (*a*) 162–171.
(*b*) 203–224.
(*c*) 254–259.
(*d*) 298–317.
(*e*) 322–325.
(*f*) 377–382.

2. Translate and comment on—*instar montis—iubes renovare dolorem ut Troianas opes eruerint Danai—duci intra muros hortatur et arce locari—equo ne credite—timeo Danaos et dona ferentis—si fata Deum si mens non laeva fuisset impulerat ferro Argolicas foedare lutebras—manus post terga revinctium—certant illudere capto—hortamur fari, quo sanguine cretus—cassum lumine—dum stabat regno incolumis—fors si qua tulisset me promisi ultorem—tamdudum sumite paenas—sanguine placastes ventos et virgine caesa—anima litandum Argolica—delitui dum vela darent si forte dedissent—quos illi paenas reposcent—quod te per superos oro miserere laborum—ex illo fluere spes Danaum—nunc quod vento petiere Mycenas, improvisi aderunt—effigiem statuere nefas quae triste piaret—oculos suffecti—scelus expendisse merentem Lacoonta ferunt—pedibus rotarum subiciunt lapsus—Cassandra nunquam credita Teucris—nos delubra deum miseri quibus ultimus esset ille dies velamus—amica silentia lunae—inclusos Danaos et pinea laxat claustra—perque pedes traiectus lora tumentis—quibus Hector ab oris expectate veris?—proximus Ucalegon ardet—pulchrumque mori succurrit in armis—obsedere angusta viarum—infelix qui sponsae praecepta non audierit—morimur et in media arma ruimus—Sensit medios delapsus in hostis—induitur insigne.*

3. Give the meaning of—*mucro, coruscus, tendo, plurima mortis imago, sentibus, fastigia, polus, exuvias, iuba sanctius, litari, pellax, crimen, terebare, vittae, ulva, lambo, bipatens.*

4. Scan line 369.

5. With what object was the Aeneid written?

6. Write a short life of Vergil, mentioning his works.

7. To what poets is Vergil indebted?

Test Paper, Vergil, Book II., 400–800.

1. Translate—
(*a*) 420–424; (*b*) 436–452; (*c*) 460–475; (*d*) 570–587; (*e*) 735–745; (*f*) 679–686; (*g*) 491–499.

2. Scan lines 411, 442, 492, 563, 745, 774.

3. Quote from the Aeneid a Hypermetric line.

4. Translate and comment on—*testor nec tela nec ullas vitavisse vices Danaum; volnere tardus Ulixi; instaurati animi regis succurrere tectis; pervius usus tectorum inter se Priami; qua summa labantis iuncturas Tabulata dabant; telis et luce coruscus aena; linguis micat ore trisulcis; labat aride crebro ianua; inutile ferrum cingitur; impulit his cingi telis; illum infesto volvere Pyrrhus sequitur; satum quo te mentiris; capulo tenus; quae sit me circum copia lustro; iura fidemque supplicis erubuit; hic exitus illum sorte tulit tot quondam populis terrisque superbum regnatorem Asiae; Erinys; exarsere ignes animo; sceleratos sumere poenas; animumque explesse iuvabit flammae; ne qua iussa time; captae superavimus urbi; inceptoque et sedibus haeret in isdem; intonuit laevum; ferimur per opaca locorum; omnem videbar evasisse viam; excedo regione viarum; inde domum me refero si forte pedem tulisset, terram Hesperiam venies; servitum matribus ibo; conatus collo dare bracchia circum.*

5. Give the meaning of *adytis, infula exuviis, bipennis, atria, ruinam trahere, ululo, armenta, coluber, Thalami, simulacra, umbo, coruscus, apex, sulcus, gaza, opima.*

6. Parse *morere, explesse.*

FRENCH.

Revise the Grammar, and pay special attention to the irregular verbs, and the rules for the agreement of the present and past participles.

ENGLISH.

The History Course was omitted last month owing to pressure of space. Read from James I. to 1700.

Note the various Parliaments in the reigns of James I. and Charles I., the growth of public resistance, and the changes that took place in the political views of the members of Parliament. Note especially the Addled Parliament, the Parliament of 1628, the Short Parliament, the Long Parliament, the Rump Parliament. The measures passed by the Long Parliament in the first two years of its life are very important.

Note the Bye and Main Plots; the Gunpowder Plot; the Rye House Plot; Titus Oates' Plot; Undertakers; Hampton Court Conference; the Millenary Petition; Divine Right of Kings and Divine Right of Bishops; the Post-rate; Raleigh; Bacon; Colonisation; Monopolies; Duke of Buckingham; Laud; Stafford; Pym; Hampden; the System of Thorough; Causes of the Civil War; Scottish League and Covenant; the Covenant; the Impeachment of the Five Members; the Grand Remonstrance; Progress of the Civil War; the Eastern Association; Independents; Levellers; the Self-denying Ordinance; the New Model; Pride's Purge; History of the Commonwealth; War in Ireland and Scotland; the Navigation Act and the Dutch War; Barebones Parliament; Sir Henry Vane; the Instrument of Government; the Humble Petition and Advice; Cromwell's Home and Foreign Policy; the Convention Parliament and the Declaration of Breda; the Pension of Cavalier Parliament; Venner's Plot; the Clarendon Code; Clarendon's Career; the Corporation Act; the Savoy Conference and the Act of Uniformity; the Conventicle Act; the Plague; the Five Mile Act; the Dutch War; the Cabal; the Triple Alliance; Sir William Temple; the Treaty of Dover; the Stop of the Exchequer; the Declaration of Indulgence; the Test Act; the Non-Resistance Bill; Danby; Buckingham; Shaftesbury; Habeas Corpus Act; the Highland Host; Petitioners and Abhorrers; Algernon Sidney; Monmouth's Rebellion; Causes of the Deposition of James II.; War in Ireland and Scotland in the reign of William III.; William's Foreign Policy; Bill of Rights; Non Jurors.

In the Grammar revise generally, and pay special attention to the Historical portion.

MATHEMATICS.

GEOMETRY COURSE.

June Course.

A careful revision of all the four books should be made, so that by the time of the examination this part of the subject is thoroughly well known.

Solutions to the riders of our May course.

1. Since FD is parallel to CA,

$$\therefore \angle DFA = \angle CAF = \angle FAD,$$
$$\therefore DF = DA.$$

Similarly FE = EB.

Also the triangle FDE is an equilateral one,

$$\therefore FD = DE = FE,$$
$$\therefore AD = DE = EB.$$

2. Let the three given straight lines form a triangle ABC, let P be any point on the given circle whose centre is O; draw PQ, PR parallel to AB, AC, then if QR be parallel to BC the problem is solved; if not, with the centre O and radius OS (where OS is perpendicular to QR), describe a circle, draw P^1Q^1 a tangent to this circle parallel to BC, draw P^1R^1 parallel to CA, and join Q^1R^1. Then $P^1Q^1R^1$ is the triangle required.

3. Let K be the length of a side of the given square. Bisect HK in M, and draw MP perpendicular to HK and equal in length to K. Join PK and produce HK to N, so that MN = PK.

By II. 6, $HN.NK + MK^2 = MN^2$
$= PK^2$
$= MP^2 + MK^2.$
$\therefore HN.NK = MP^2 = K^2$ as required.

4. This problem can be solved by constructing an isoceles triangle equal in area to the triangle ABC where ABCD is the given parallelogram. This is done by bisecting BC in D and drawing DE perpendicular to BC to meet AE parallel to BC in E. The triangle EBC is equal in area to ABC, and is isoceles. Complete the parallelogram EBCF by drawing BF, CF parallel to EC, EB respectively. Therefore EBCF is the rhombus required.

ARITHMETIC COURSE.

A general revision of those parts of the subject in which the student feels himself to be weak should be made, more especially the approximate methods of Multiplication, Division, and Square Root should be carefully revised.

Illustrative examples :—

1. A person finds he can obtain £5 more per annum by investing in the $3\frac{1}{2}$ per cents. at 96 than in the 3 per cents. at 88. How much has he to invest?

£100 invested in the $3\frac{1}{2}$ per cents at 96 produce an income of

$$\frac{100 \times 3\frac{1}{2}}{96} = £3\frac{13}{24}.$$

£100 invested in the 3 per cents. at 88 produce an income of

$$\frac{100 \times 3}{88} = £3\frac{9}{22},$$

the former income being the larger by $£3\frac{13}{24} - 3\frac{9}{22}$, or $£\frac{35}{528}$.

In order for the former to be £5 larger than the latter he must then invest a sum of $\frac{100 \times 5 \times 528}{125} = £2112$.

2. Calculate to 3 decimal places the value of

$$1 + \frac{1}{1.2} + \frac{1}{1.2.3} + \frac{1}{1.2.3.4} + \ldots\ldots$$

$1 = 1,$

$\frac{1}{1.2} = .5,$

$\frac{1}{1.2.3} = \frac{1}{4}$ of $\frac{1}{1.2} = \frac{1}{4}$ of $.5 = .1666\ldots\ldots$

$\frac{1}{1.2.3.4} = \frac{1}{4}$ of $= \frac{1}{1.2.3} = \frac{1}{4}$ of $.1666 = .0416\ldots\ldots$

Proceeding thus the series $= 1 + .5 + .1666 + .0416 + \ldots\ldots$
$= 1.7182.$

SOLUTIONS TO QUESTIONS SET LAST MONTH.

1. £2,042 12s. $10\frac{7}{33}$.

2. $$\sqrt{\frac{7}{5}} = \frac{\sqrt{35}}{5} = \frac{5.916\ldots}{5} = 1.183\ldots\ldots$$

or thus :—

$$\sqrt{\frac{7}{5}} = \sqrt{1.4} = 1.183\ldots\ldots$$

3. Let $D = .2\dot{7}\dot{9} = .2797979\ldots\ldots$
Then $1000D = 279.7979\ldots\ldots$
and $10D = 2.7979\ldots\ldots$

By subtraction

$$990D = 277,$$

$$\therefore D = \frac{277}{990}.$$

ALGEBRA COURSE.

A general revision of the subject should be made, and such pieces of bookwork as the proof of the rule for finding H.C.F., the proofs of the formulæ used in Progressions, should be studied.

Illustrative examples :—

1. Sum the series

$$100^2 - 99^2 + 98^2 - 97^2 + \ldots\ldots + 2^2 - 1^2.$$

$100^2 - 99^2 = (100 - 99)(100 + 99) = 100 + 99.$
$98^2 - 97^2 = (98 - 97)(98 + 97) = 98 + 97.$
$2^2 - 1^2 = (2 - 1)(2 + 1) = 2 + 1.$

Hence the series is the same as

$$100 + 99 + 98 + 97 + \ldots\ldots + 2 + 1.$$

This is an arithmetical progression and may be summed by the formula

$$s = \frac{n}{2}(a + l)$$
$$= \frac{100}{2}(100 + 1)$$
$$= 5050.$$

2. If b be the arithmetic and mb the geometric mean between a and c, prove that $\frac{1}{a}$, $\frac{1}{m^2 b}$, and $\frac{1}{c}$ are in A.P.

Here we are required to prove

$$\frac{1}{m^2 b} = \frac{\frac{1}{a} + \frac{1}{c}}{2}.$$

We are given $$b = \frac{a + c}{2} \quad \ldots\ldots \quad (1)$$

and $$m^2 b^2 = ac \quad \ldots\ldots \quad (2).$$

Now $$\frac{1}{m^2 b} = \frac{b}{m^2 b^2} = \frac{\frac{a + c}{2}}{ac}$$
$$= \frac{a + c}{2ac};$$
$$\therefore \frac{1}{m^2 b} = \frac{\frac{a + c}{ac}}{2} = \frac{\frac{1}{a} + \frac{1}{c}}{2} \text{ as required.}$$

3. Find the sum of all numbers between 1000 and 2000 which are not divisible by 2 or 5.

The sum of the odd numbers from 1000 to 2000
$= 1001 + 1003 + 1005 + \ldots\ldots + 1999$
$= \frac{500}{2}(1001 + 1999)$ by formula $s = \frac{4}{2}(a + l)$
$= 750000.$

Now sum of

$$1005 + 1010 + \ldots\ldots + 2000 = \frac{100}{2}(1005 + 2000) = 150000,$$

$\therefore$ required sum $= 750000 - 150000$
$= 600000.$

4. How many terms are there in the series whose first three and last terms are 1, 4, 7 and 331?

Here

$a = 1$, $d = 3$, n ?, $l = 331$

$l = a + (n-1)d.$
$331 = 1 + 3(n-1).$
$\therefore 3n = 333.$
$\therefore n = 111.$

5. Solve $x^2 - 47x + 1 = 0.$

$$x^2 - 47x = -1,$$
$$\therefore x^2 - 47x + \left(\frac{47}{2}\right)^2 = \frac{2209}{4} - 1 = \frac{2205}{4},$$
$$\therefore x - \frac{47}{2} = \pm\frac{\sqrt{2205}}{2} = \pm\frac{21\sqrt{5}}{2},$$
$$\therefore x = \frac{47 \pm 21\sqrt{5}}{2}.$$

6. Write down all numbers between 100 and 200 which are of form $3x^2 + 5$.

Numbers of this form are $3 \cdot 1^2 + 5 = 8$
$3 \cdot 2^2 + 5 = 17$
$3 \cdot 3^2 + 5 = 32,$
Those above 100 are $3 \cdot 6^2 + 5 = 113$
$3 \cdot 7^2 + 5 = 152$
$3 \cdot 8^2 + 5 = 197.$

MECHANICS COURSE.

Loney's Chapters XI. and XVI. may be read, and the past work revised.

The proofs of the formulæ used in the dynamical portion of the subject should be got up, and the examples worked out in our previous courses would repay a careful perusal. Newton's laws of motion, the equation $P = mf$, the definitions of mass, weight, force, acceleration, work, energy, and momentum, and the units in which they may be reckoned—all ought to be well known.

Illustrative examples :—

1. Without the use of any formulæ find the acceleration produced by a force of 28 lbs. acting on a mass of 1 cwt.

From the fact that a body of mass 1 cwt. falling under the action of gravity falls with an acceleration of 32 ft./sec.^{2}, we know that

1 cwt force acting on 1 cwt. mass gives it an $f = 32$ ft./sec.^{2},

$\therefore$ $\frac{1}{4}$ cwt. or 28 lbs. ,, ,, ,, $f = \frac{32}{4}$ or 8 ft./sec.^{2}.

2. What is the energy in ft. lbs. possessed by a mass of 1 cwt. moving at the rate of 8 ft. per sec. ?

Kinetic energy $= \frac{1}{2}mv^2$
$= \frac{1}{2} \times 112 \times 8^2$ ft.-poundals
$= \frac{112 \times 8 \times 8}{2 \times 32}$ ft.-lbs.
$= 112$ ft.-lbs.

3. A body of mass 10 lbs. is 9 feet above the surface of some water 9 feet deep; it is let fall, and reaches the ground with a

velocity of 32 ft. per sec. Find the resistance, supposed uniform, of the water.

Here a mass of 10 lb. is 18 feet from the ground, or possesses 180 foot-pounds of energy.

On reaching the ground it has a velocity of 32 ft. per sec., and so possesses $\frac{1}{2} \times 10 \times 32^2$ ($\frac{1}{2}mv^2$) foot-poundals, or 160 ft.-lbs. of energy.

It has thus lost 180 — 160 or 20 ft.-lbs. of energy, which has done work against the resistance R lbs. of the water through the depth 9 ft.

$$\therefore 9R = 20,$$
$$\therefore R = 2\tfrac{2}{9} \text{ lbs.}$$

It is instructive to note also the following method :—

The velocity of the 10 lbs. on reaching the surface of the water is given by the formula

$$v^2 = 2gs = 64 \times 9,$$
$$\therefore v = 24 \text{ ft. per sec.}$$

We have then on entering the water

$$\left.\begin{matrix} u = 24 \\ s = 9 \\ v = 32 \\ f ? \end{matrix}\right\} \begin{matrix} v^2 = u^2 + 2fs. \\ 32^2 = 24^2 + 18f. \\ \therefore f = \frac{224}{9} \text{ ft./sec.}^2. \end{matrix}$$

Let now R lbs. be the required resistance, so that (10 — R) lbs. or 32 (10 — R) poundals is the force causing the downward motion.

Hence by equation $P = mf$,

$$32\,(10 - R) = \frac{10 \times 224}{9},$$

leading to $R = 2\frac{2}{9}$ lbs. as before.

4. A body weighs 6 lbs. in air and 2 in water, what is its sp. gr. ?

Here it weighs 4 lbs. less in water than in air, *i.e.* the water supports it with a force of 4 lbs.,

$\therefore$ weight of water displaced = 4 lbs.,

i.e. weight of an equal volume of water = 4 lbs.,

$$\therefore \text{sp. gr.} = \frac{6}{4} = \frac{3}{2} = 1\tfrac{1}{2}.$$

CHEMISTRY COURSE.

A general revision of the Chemistry required in the syllabus should be made.

OUR L.L.A. COURSE.

HONOURS EDUCATION.

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Author of 'Mental Science and Logic for Teachers,' and of 'The L.L.A., What it is and How to Get it.'

DIGEST AND NOTES.

In reading this chapter on the schools of Berlin, it will be of great service to the student to read the special chapter on the 'Realschulen in Berlin' as set out in First Book of Special Reports. Instead of only five Realschulen there are now 'In the city of Berlin, 12 municipal Realschulen which hold an important place in the educational system of the capital.' So popular has the Realschule become in Prussia, that it is called the 'darling of the Prussian Education Department (das Lieblingskind der preussischen Unterrichtsverwaltung).

Friedrich — Wilhelms Gymnasium a public school with a modern side or department, the Realschule, and a preparatory section—the Vorschule. The two former are self-supporting. Endowment = only £400 per annum.

History of the School.—Founded in 1747 as the Latin school of a group of Schools called by Johan Hecker, the founder, a Realschule. Rebuilt 1803 and given its present name, King giving £10,000. Passed under Government in 1809, therefore now under the School Board for Brandenburg. Protestant school. Staff, 66 teachers, 21 of whom are for gymnasium ; of these 11 are Oberlehrer, seven with the title of Professor. Dr. Ranke, the director, lives on the premises although the school is not a boarding school. The Latin inscription to Hecker's original school means 'This building of the school of the Trinity has been dedicated to the instruction of the young to the honour of God, the joy of the King and the welfare of the citizens.' Fees £3 18*s.* N.B.—The fees charged to-day in the Realschulen of Berlin are £4 per annum, which is regarded by the 'Report' as very low. Ten per cent. of the scholars were free. This is the proportion that is maintained to-day.

Dr. Ranke's lesson on the Philoctelis of Sophocles : (1) delivered in Latin : (2) was thorough and scholarly like Arnold of Rugby.

Zumpt on Cicero with *unterprima* was a running translation into good idiomatic German, and again showed good grasp of the language and so always Latin and Greek were taught as literature : **'The place and significance of an author in his country's literature, and in that of the world' being well conceived.** This is high praise and removes the greatest objection to classical teaching. See chapter on Renascence in Quick's 'Reformers.' This avails much more than ability to write Greek or Latin verse as did also the study of Lessing's essay on the epigram. The *tertia* exercise on Ovid of home translation into German then into non-metrical German followed by repetition in English was a good exercise, as was also the religious instruction in *quinta* which was based on a good text-book and good questioning.

Text Books are (1) chosen by the masters (2) subject to the approval of the Provincial Board who (3) must obtain the approval of the Education Minister and his Council, but when thus approved may be used in any school similar to the one for which it has been approved. Arnold's commendation of this, and his condemnation of the English system does not strike me as wise. In Ireland where the text and school books are State approved, they are sorry stuff. It is a hard saying that 'in no other secondary schools in Europe do the pupils spend so much time in learning such utter nonsense as they do in ours.'

Grey Friars.—The 'robust appetite' for humanities should rather be called the robust cramming of the verbal memory.

The endowment of £33,000 was wisely spent in stipends, pensions and exhibitions ; 25 per annum pass the *Abiturientenexamen.* The *Alumnate* are for foundations. The ordinary boarder lives with an approved family not in a house with the master and other scholars as in English boarding schools.

The first Alumnat of Berlin the *Joachimsthalsche Gymnasium :* 120 Alumnen or collegers, *i.e.* boarders as in an English boarding school, 12 Pensionaire or establishment boarders, the rest being day boys. Other points to notice are the absence of the religious difficulty and the number of eminent scholars, such as Buttmann, Zumpt, who had at one time or other had charge of these gymnasien.

The Schulpforta Alumnat in Saxony was secularised in 1540 and endowed by Duke Maurice in 1543. Venerable pile situate amidst meadows, hills and woods. Revenue from £8,000 to £9,000. Observe the list of great scholars. Latin verse is taught here, and 'there is a noteworthy usage here of making one day in the week a **Studientag**, in which the boy is free from all school lessons that he may pursue his private studies.' An excellent practice. Note its application to gymnasien generally.

Gymnastics versus games. Games of course are infinitely preferable. Refer to what Quick says on this point. But Arnold's two exceptions, viz., the hard student and the young scholar may be allowed. The mixed gymnasium at Cologne is interesting as a concrete example of how the religious difficulty was and is effectually settled in Germany. Note the director's declaration 'that the Government found it impossible to treat their school patronage politically, even so far as the directors or head masters were concerned.' Modern languages well taught in Germany but badly taught in England, natural science poorly taught in Germany also. This statement would not pass muster now-a-days and probably was not true when written, as Arnold was, as he confesses, ignorant of science. The Realschulen are successful institutions now as we have shown at the beginning of this article. The diatribe against the utilitarians with which the chapter finishes is an expression of one side of a truth. If, as Spencer says, you can get discipline out of useful subjects—and you can—subjects likely to be useful in after life should and will be given a preference.

Chap. VII. Liberal culture—whether by using the humanities or the natural sciences as instruments—liberal culture is the work of the secondary school. The **special school** should give a professional direction to what has been learnt at the secondary school, whilst the **university** should organise, *i.e.*, develop into science the knowledge brought from the secondary school. 'Thus in the university, the idea of science is primary, that of the profession secondary ; in the special school, the idea of the profession is primary, that of science secondary. This is a very neat expression of a great truth and deserves careful consideration.

Six complete Universities with the four faculties, two incomplete universities with the two faculties of theology and philosophy. Particular points to be noted are (1) the free circulation of the German students amongst the universities of the fatherland. (2) The operation of the Maturitätsprüfung. (3) Rector, Curator, Full Professors (2 free lectures at least per week on his subjects), Extraordinary Professors, Privatdocenten, Quaester, and the four faculties of **theology, law, medicine** and **philosophy.** The connection and interaction of Professors and Privatdocenten are also important

points of interest. The Habilitation of the Privatdocenten must also be understood and remembered. The difference between the influence of the Privatdocent upon the university and that of his English type, the private tutor, is very evident.

Examinations are justly appraised by Arnold and much credit is due to him for his sound judgment in this respect thirty years ago, when even to-day the worshippers of the fetish are legion. '**Le pays à examens, l'Autriche, est precisement celui dans lequel on ne travaille pas.**' A more sweeping condemnation than this of Laboulaye could not be voiced. Arnold's words also : '**All I say is that a love for the thing is what we want, and that examinations will never give it.**' In whatever respect Prussian practice may be deficient it certainly seems to have hit the right way respecting examinations. '**The examination test is never used in Prussia as sufficient in itself ; it is only used to make the assurance of a really good education doubly sure.**' The university certificate of 'what lectures he has attended and what the character of his career has been,' together with the school-leaving certificate are much more valuable to a young Prussian than anything of like nature obtainable in this country can be to the young Englishman, the pity of which is that a good secondary education is not therefore esteemed by us as in Germany.

Lehrfreiheit, Lernfreiheit and **Wissenschaft,** these are the boons conferred upon German universities that make the training much more valuable than to us. '**The French university has no liberty, and the English universities have no science: the German universities have both.**' This is high praise from an expert. Try to judge correctly whether or no it is deserved, giving your reasons for your opinion.

Chapter VIII. (*a*) **The Course of Study.**—The conflict between classical and modern studies, between the **humanities** and **realien.** On this point there is still much discussion and much conflict ; but some advance has been made, and it is all in favour of the modern side. Thus Mr. Sadler in his special report says, 'Shrewd observers believe that it will probably be found necessary to maintain in Prussia three types of secondary education, viz. : (1) That which is **predominantly classical,** (2) that which is modern, but **predominantly scientific and mathematical,** (3) that which is not less purely modern than the second type, but lays the greatest stress on **linguistic** and **humane studies.** This up-to-date opinion should be kept in mind in reading this chapter. Arnold was right in pointing to a compromise, as the exisence of the Oberrealschule goes to show. '**The aim of education, 'to enable a man to know himself and the world.**' Cf. this with Spencer's 'Complete Living.' The two are not irreconcilable. History of ancient civilisations undoubtedly does help modern civilisation, for in this as in other respects history has the knack of repeating itself. '**But it is also a vital and formative knowledge to know the world, the laws which govern nature, and man as a part of nature.**' Arnold does not proceed to claim that all should learn all. In this he is wiser than Spencer. The business of instruction is to train natural aptitude, and here the threefold school provision given above will assert its appropriateness. The difficulty will be to discover in which direction the natural aptitude trends. There must be a **rapprochement** between humanist and realist, both confessing the inter-connection and action between humanities and realien, so that it may be understood that no training is complete which does not take cognisance of the complete circle. Thus there is training in Homer and in chemistry for all men. The 'patchwork' spoken of in p. 161 is the direct outcome of incomplete training. 'But if school instruction in the natural sciences has almost to be created, school instruction in letters has almost to be created anew.' Arnold agrees with Quick that the inwardness of the humanities is rarely reached. There are few Wolfs, 'nine of ten, especially in England, **where so much time is given to Greek and Latin composition,** never get through the philological vestibule at all, never arrive at **Alterthumswissenschaft** which is **a knowledge of the spirit and power of Greek and Roman antiquity learned from the original works.**' This is because the preliminary introduction to the real essence of the subject, whether the humanities or science be concerned, has been unduly and inordinately extended, and here Arnold undoubtedly points to a weak spot that may be removed for 'a Latin grammar of 30 pp., and the most elementary treatise of arithmetic and of geometry, would amply suffice for the uses of philology and mathematics as a universally imposed preparatory discipline.' It is easy to agree with Arnold that 'the modern spirit will deprive Latin and Greek composition and verbal scholarship of their present universal and preponderant application in our secondary schools,' and will make a much bolder bid for literature and modern languages. The plea for the home teaching of modern languages so as to make the culture therefrom free from the 'thin and shallow aspersion' must commend itself to all. This, Mr. Sadler gives as 'the opinion of the German schoolmasters.' Great stress is laid on the necessity of having German teachers to teach foreign tongues in these (German) schools. It is held that only a German teacher can fully enter into the difficulties naturally encountered by a German boy. The same, of course, applies to the English boy, as Mr. Arnold claims. 'It is as literature, and as opening fresh roads into knowledge, that the modern foreign languages, like the ancient, are truly school business.' This puts the matter in a nutshell, and should therefore be carefully remembered. The summary on pp. 175–8 should be read and re-read until it is thoroughly grasped and can be reproduced.

Chap. IX. (*b*) **School Establishment.** The opening contention of Mr. Arnold that 'our civil organisation in England still remains what time and chance have made it,' is not altogether so true as when he made it, for we have now in each village the Parish Council, and in addition School Boards have sprung up all over the land to make, and sometimes, alas ! to mar, the primary part of public instruction ; furthermore, these same School Boards have done something towards secondary education by the establishment and development of Higher Grade and Organised Science Schools, which are similar to the Realschulen of Prussia. But we are still paying a heavy price for our 'liberty,' *i.e.*, our liberty to deprive ourselves of a much-needed education. Even in the matter of primary schools, 'the clergyman, the esquire, or the mill-owner' have still 'my school,' and compulsion is a very unreal thing. When we come to secondary education, every word of Mr. Arnold's recommendation is as appropriate now as when it was writtten. It is true that the County Councils administer—fearfully and wonderfully, be it said by parenthesis—some sort of technical education ; it is true also that a kind of mongrel authority is, under the auspices of the Science and Art Department, setting itself up here and there in the country ; but this only illustrates the happy-go-lucky rule-of-thumb manner in which educational matters are allowed to adjust themselves as they will. The small proportion of middle-class children educated on the higher plane, advocated by Mr. Arnold, is perhaps smaller than in his time, and although we have the Victoria and Welsh Universities, we have no reform in university study, so that the real number of students under university teaching is as small as ever, and the **social** as well as the **industrial** inconvenience still remains with us.

Science. What Arnold means by this ever-recurring word is a systematic organisation of the knowledge governing an act in accordance with which the art should be practised ; the very opposite to what he calls '**The English notion—for which there is much to be said if it were not pushed to such an excess, is, that you come to do the thing right by doing it, and not by first learning how to do it right and then doing it.**' The argument for translation is a good one and applies to-day. The engineering incident also deserves to be remembered.

CRYING NEEDS.

(1) **A public system of schools is indispensable in modern communities.** 'There is no gainsaying this, for of the public schools you can take guarantees, of private schools you cannot.'

(2) **An Education Minister** who should administer primary, secondary, and university education. This we have not.

(3) **A High Council of Education.** The present Committee of the Privy Council is an Educational Council but in name. What is wanted is a Council of the best informed and most enthusiastic lovers of education throughout the country. This Council should at once attend to (*a*) **competitive examinations** for scholarships, (*b*) **entrance into the Civil Service,** for which leaving certificates should count, (*c*) **the organisation of schools and university examinations,** (*d*) **school books,** (*e*) **school studies and plans of work.**

(4) **Provincial School Boards,** which would differ materially from School Boards as existing now, being rather copies *in petto* of the High Councils.

To create schools, endowments must be overhauled and be earmarked for their transfer—a thing likely to be long in coming, albeit that '**wherever there is a school endowment, there is a right of public supervision,**' will be accepted on all hands as incontrovertibly true. Arnold's plan is a good one, but abuses die hard, especially the abuse of endowments.

University Instruction.—Under this head some hard hits are given to both the old and the new universities. Oxford and Cambridge are lounging places for the gilded youth to 'prolong to a very great age, and under some very valuable influences, their school education,' *i.e.*, they are high schools or colleges and not universities. London is complimented upon the true university standard of her examinations, but she is not a university in the true sense of the word, being merely an examining body, Where the students now leave off they should begin, for the B.A. Exam. is 'merely the **Abiturientenexamen.**'

Examination should be by an independent board and not by college tutors, surely a very reasonable claim, but farther there should be '**facilities for following a line of study system-**

atically, under first-rate instruction' at any university worthy of the name, and for this we have to go to the Continent.

Polytechnics and Trade Schools.—In this particular much progress has been made, but very much more remains to be done before we are within measurable distance of Germany or France. The Science and Art Department has done some good work, but it is not popular amongst the leaders of scientific and technical work, some saying that it acts rather as a drag than as a spur.

The Education Department should conduct the entrance examination to the universities; the Degree examinations should be conducted by a Board of Examiners gathered from the whole of the country, and examining the whole of the country, for only Oxford, Cambridge, and London should grant degrees, the functions of the new universities being restricted entirely to teaching; moreover, Oxford and Cambridge professors should be 'loaned' to the poorer universities, which should be taken to the people at the crowded industrial centres where the dearth is greatest. First and foremost London should be a teaching university in place of a mere degree granting body.

As the reader knows, this last recommendation stands in the way of probable realisation; but although the degree is to be granted by a Board of Examiners, it will probably consist mainly of those very tutors whom Arnold, in common with all who have given a moment's thought to the question, declare to be of all men the most ineligible for such a post.

'For some classes of post in the public service, the having passed the leaving examination of a public school ought to be demanded; for others, the having gone through the appointed courses and passed the appointed examinations in certain faculties, or in certain special schools; for all, one or the other.' This is the often-claimed practical public recognition of the value of a good school course, and will, we think, ultimately be adopted; already there are signs that the examinations for the Lower Division of the Civil Service shall include French and other subjects of secondary education in their syllabus, and from this to the recognition of the school in the curriculum of which these subjects are embraced is but a step. The appointment of professors by the Education Minister for the Crown would be a great step towards the insurance that a fair field and no favour would be shown, to the end that the best man might be chosen for the post.

Questions on Arnold.

1. Write a short account of the work done in the chief Gymnasia in Germany (1892.)
2. Write a summary of the chapter on school studies; and criticise its main positions. (1892, 1893.)
3. At what main conclusions does Mr. Arnold arrive in his final chapter? (1892, 1894, 1895, 1896.)
4. Write an account of the Friedrich Wilhelm Gymnasium. (1893.)
5. Describe fully university instruction in Prussia. (1893, 1895, 1896.)
6. What proposals does Mr. Arnold make for the better organisation in this country of secondary and university instruction (compare 3). (1893, 1894, 1896.)
7. Contrast the English system of education with those of France and Prussia. (1894.)
8. Write an account of the Prussian system as seen in operation in particular schools (compare 1). (1896.)
9. Compare the French and German university systems. (1896.)

This course being now finished, it remains for the author to most heartily wish success to those of his readers who are presenting themselves for the L.L.A. examination in Honours Education. He will be particularly obliged to those who succeed in passing, and who have worked this course, if they will send him a post-card announcing their success, as one is naturally anxious to know the result of one's labours.

With respect to those of our readers who have asked for other courses in other subjects, the Editor regrets that inexorable space considerations will not permit this to be done, especially as the number wishing to take any particular subject is naturally somewhat small, whereas all teachers take Education as a matter of course. The L.L.A. course will, therefore, conclude with this article; but we shall at all times be willing to advise our readers as to what they should do in the selection of subjects, and to solve any difficulties that may crop up in connection with the study of any subject, or any branch of a subject. The syllabus for 1898–9 can be obtained from the Secretary, L.L.A. Scheme, St. Andrews, Scotland, from whom also, after a reasonable interval, copies of the questions set, with lists of successful students, may be obtained at a charge of 1s.

We wish our readers a successful and a speedy attainment of the L.L.A. diploma.

QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

Utopia.—A rigid body acted on by any forces turns round a fixed axis; find the angular acceleration. ABCD is a square, HKL is an isosceles triangle with a right angle at H; they have equal masses and equal uniform densities; they turn round horizontal axes at right angles to their planes, and passing through A and H respectively, under the action of gravity; compare their angular acceleration when the diagonal AC and the line bisecting the angle H are equally inclined to the vertical. (S. and A. Dept., 1893.)

For the first part, see February 'P. T.' Query Column, p. 433.

Let M be the mass of each, l the length of the side of square, and therefore, since areas are equal, side of triangle is $l\sqrt{2}$.

Let the diagonal AC, and the line bisecting the angle H, make with the vertical an angle θ.

Then distance of C.G. of square from A $= \frac{l}{\sqrt{2}}$; hence moment of resultant force on square about A $= Mg\frac{l}{\sqrt{2}}\sin\theta$.

Therefore $$Mg\left(\frac{l}{\sqrt{2}}\right)\sin\theta = I_1\alpha_1. \quad (1)$$

If you have any difficulty in finding the moment of inertia I_1 about A, remember the fundamental principle which states that the moment of inertia of any lamina about any axis perpendicular to its plane is equal to the sum of the moments of inertia about two lines in the plane, which intersect at right angles in the point where the above axis meets the plane.

Since the moment of inertia of the square about a side is $\frac{Ml^2}{3}$, therefore the moment of inertia about A is $\frac{2Ml^2}{3}$. In the same way, the moment of inertia of triangle about H is $\frac{2}{3}Ml^2$.

For triangle, we have

$$Mg(\tfrac{2}{3}l)\sin\theta = I_2\alpha_2. \quad (2)$$

From (1) and (2)

$$\frac{\alpha_1}{\alpha_2} = \frac{3}{2\sqrt{2}} = \frac{3\sqrt{2}}{4}.$$

X. Y. Z.—Solve the following simultaneous equation:—

$$x^2 - yz = ax \quad . \quad . \quad . \quad . \quad . \quad . \quad (1).$$
$$y^2 - xz = by \quad . \quad . \quad . \quad . \quad . \quad . \quad (2).$$
$$z^2 - xy = cz \quad . \quad . \quad . \quad . \quad . \quad . \quad (3).$$

Multiply (1), (2) and (3) by y, z, and x respectively.

Add and we obtain $axy + byz + cxz = 0 \quad . \quad . \quad . \quad . \quad (4)$.

Multiply (1), (2) and (3) by z, x and y respectively.

Add and we obtain $bxy + cyz + axz = 0 \quad . \quad . \quad . \quad . \quad (5)$.

Multiply (4) by a, and (5) by c and subtract, thus we obtain $(a^2 - bc)xy + (ab - c^2)yz = 0$, from which $y = 0$ *or* $(a^2 - bc)x + (ab - c^2)z = 0$;

that is $y = 0$, *or* $x = \frac{c^2 - ab}{a^2 - bc} \cdot z$.

Similarly $y = \frac{c^2 - ab}{b^2 - ac} \cdot z$.

Substituting these values of x and y in (1), (2), or (3), say in (3), we get

$$z^2 - \frac{c^2 - ab}{a^2 - bc} \cdot \frac{c^2 - ab}{b^2 - ac} \cdot z^2 = cz.$$

This gives $z = 0$, *or* (on simplification)

$$z = \frac{(a^2 - bc)(b^2 - ac)}{3abc - (a^3 + b^3 + c^3)}.$$

In exactly the same manner we may find

$$y = \frac{(a^2 - bc)(c^2 - ab)}{3abc - (a^3 + b^3 + c^3)}, \quad x = \frac{(b^2 - ac)(c^2 - ab)}{3abc - (a^3 + b^3 + c^3)}.$$

Also $x = 0$, $y = 0$, $z = 0$, would clearly satisfy the equations.

Solutions to queries sent by '*Nanna*,' '*Cattoch*,' '*Pioneer*,' '*J. Dier*,' '*Saplins*,' '*A. J. T.*,' '*Aspirant*,' '*Oxonian*,' '*Puzzled*,' '*Streatham Hill*,' '*Taffy*,' '*Statics*,' '*J. B. Holmyard*,' '———,' '*W. G.*,' '*C. H. T.*,' '*Heathfield*,' '*Tim*,' may be obtained on application to the Editor.

OUR SCIENCE SECTION

DIFFERENTIAL AND INTEGRAL CALCULUS FOR BEGINNERS.

FUNCTIONS (*continued*).

Tangents.—Let ABC represent a part of the curve corresponding to the analytical expression $y = f(x)$. Let any point B be taken on

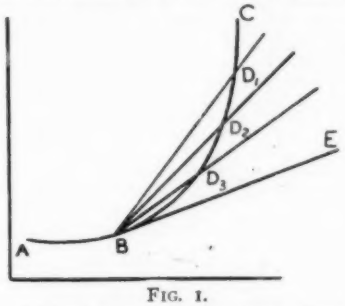


FIG. 1.

this curve, and a straight line BD_1 be drawn through it and any other point D_1 on the curve. If now successive points D_2, D_3, D_n, are taken between D_1 and B, it will be seen that the straight line drawn through B and any one of these points D_n will approach the limiting position BE as D_n is taken nearer and nearer to B. BE is termed the tangent to the curve ABC at the point B. It may be defined as *a straight line passing through* B *and another point on the curve infinitely near to* B.

The student must carefully distinguish between the terms *tangent to a curve* (which has the meaning above assigned) and the *tangent of an angle*, which represents the trigonometrical ratio *perpendicular* base for a right-angled triangle.

Let us now see what procedure may be employed in order to determine the inclination of the geometrical tangent at any point of a curve with regard to the axis of x.

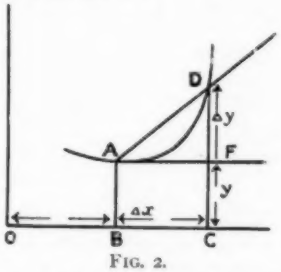


FIG. 2.

Let A be the given point on the curve, whose equation is $y = f(x)$. Then if we substitute the length OB for x in this equation, we shall obtain the value of y corresponding to AB.

Now take another point, C, on the x axis, and let BC be denoted by Δx. Draw CD through C perpendicular to OX, cutting the given curve in D. Then the length DC will be obtained by substituting the length OC, *i.e.* $x + \Delta x$, in the equation of the curve. Draw AF parallel to OX. Then since FC = AB = y, we may represent FD by Δy. Thus Δy represents the increment of y corresponding to the increment Δx of x; or, to put it in different words, when any value of x is increased by Δx, the corresponding value of y is increased by Δy.

The trigonometrical tangent to the angle $DAF = \frac{DF}{AF} = \frac{\Delta y}{\Delta x}$, as above defined. Hence $\frac{\Delta y}{\Delta x}$ represents the trigonometrical tangent of the inclination of AD to the axis of x. If D is supposed to approach indefinitely near to A, the line AD will approximate to the tangent at A to the given curve. But as the length AD becomes indefinitely small, both DF and AF, *i.e.* Δy and Δx, will become indefinitely small. What we are concerned with, however, is the *ratio* of $\frac{\Delta y}{\Delta x}$, and though both numerator and denominator diminish in value, the above ratio will generally tend toward a finite limiting value. This limiting value will give *the tangent of the angle that the geometrical tangent to the curve, at the point* A, *makes with the axis of* x.

Now we have

$$y + \Delta y = f(x + \Delta x).$$
$$y = f(x).$$
$$\therefore \Delta y = f(x + \Delta x) - f(x).$$
$$\frac{\Delta y}{\Delta x} = \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

If we now let Δx decrease indefinitely, *i.e.* approach a value zero, we may re-write the above equation :—

$$\frac{dy}{dx} = \left(\frac{f(x + \Delta x) - f(x)}{\Delta x}\right) \text{ when } \Delta x = 0.$$

$\frac{dy}{dx}$ is thus equal in value to the tangent of the angle that the geometrical tangent at the point (x, y) of the curve makes with the axis of x. $\frac{dy}{dx}$ is generally called *the differential coefficient of* y *with respect to* x.

A much clearer notion of the exact purport of the above reasoning will be gained by taking a few simple examples. Take the equation $y = a + bx$, which was shown in a former paper to represent a straight line passing through the point ($y = a$, $x = 0$), and inclined at an angle whose tangent is b, to the axis of x.

$$y = a + bx. \quad (1)$$
$$y + \Delta y = a + b(x + \Delta x).$$
$$\therefore \Delta y = a + b(x + \Delta x) - (a + bx).$$
$$\frac{\Delta y}{\Delta x} = \frac{b\Delta x}{\Delta x} = b.$$
$$\therefore \frac{dy}{dx} = b.$$

Since the particular curve represented by (1) is a straight line, the tangent to this curve (*i.e.* a straight line passing through two very nearly coincident points on (1)) is a straight line coinciding with 1.

The interpretation of the equation $\frac{dy}{dx} = b$ may be left to the student, who should carefully re-read the foregoing part of the present paper.

Take the equation $y = 4ax^2$. This represents, as explained in a former paper, a parabola passing through ($x = 0$), ($y = 0$), and having a focus at a distance from the origin $= a$, along the axis of y. The general form of this curve is given in Fig. 3.

$$y = 4ax^2.$$
$$y + \Delta y = 4a(x + \Delta x)^2 = 4ax^2 + 8ax\Delta x + 4a(\Delta x)^2.$$
$$\frac{\Delta y}{\Delta x} = \frac{(y + \Delta y) - y}{\Delta x}$$
$$= \frac{4ax^2 + 8ax\Delta x + 4a(\Delta x)^2 - 4ax^2}{\Delta x}$$
$$\frac{\Delta y}{\Delta x} = 8ax + 4a\Delta x. \quad (2)$$

The latter expression is obtained by dividing out by Δx. Now let us suppose that we decrease Δx indefinitely; the first term on the right hand side of (2) is independent of Δx, but the second term,

viz. $4a\Delta x$, can be made as small as we please by decreasing the value of Δx. Hence when Δx is made infinitely small, and, as a consequence, we write $\frac{dy}{dx}$ instead of $\frac{\Delta y}{\Delta x}$, (2) becomes

$$\frac{dy}{dx} = 8ax + 0.$$

This means that if we take any point, A, on the parabola, Fig. 1, so that OB $= x$, the inclination θ of the tangent AC to the line OX (or AD) is determined from the equation

$$\frac{dy}{dx} = \tan\theta = 8ax.$$

As the whole of the reasoning connected with both the differential and integral calculus depends on the method just employed, it is well here to carefully note the exact procedure followed.

We are given the equation $y = f(x)$. From this, by the above train of reasoning, we deduce

$$\frac{\Delta y}{\Delta x} = \frac{f(x + \Delta x) - f(x)}{\Delta x},$$

when Δx and Δy denote the corresponding finite increments of x and y. We now have to expand the expression $f(x + \Delta x)$ in a series of ascending powers of Δx, and subtract $f(x)$ from this series. We then divide through by Δx, and finally put $\Delta x = 0$, when we obtain the value of $\frac{dy}{dx}$.

It should be noticed that in (2) we neglect the second term on the right-hand side, since it is infinitely small *in comparison with the first term*, which we retain. Further, the student will have to slightly modify his ideas of the meaning of 0, or zero, in order to follow the developments of the higher mathematics. In ordinary arithmetic and elementary algebra, 0 denotes *no-thing*, and as long as we are dealing with mere numbers that definition is sufficiently accurate. Thus $3 - 3 = 0$, if the 3 in each case denotes (for examples) apples or pennies. But if we speak of subtracting one length from another, *i.e.* 3 yards — 3 yards, another meaning may be given to the result. For instance, if both magnitudes are measured with scales correct, say, to one-tenth of an inch, but each involving a possible error of measurement which may amount to several hundredths of an inch, we might write the above equation.

3 measured yards — 3 measured yards = a quantity not greater than $\frac{1}{10}$ inch, which may be neglected as being beyond our power to measure with the given graduated scales.

A simple example of the meaning of neglecting a certain value in comparison with another value may be given. A man whose income amounted to some thousands of pounds would not count any odd halfpence in his possession at the end of the year. He would neglect the halfpence in comparison with the pounds. On the other hand, to a beggar whose capital amounted to 2¾d., a halfpenny might have a value far from negligible.

To return now to the parabola. Consider the following problems :—

1. At what points on the parabola given by the equation $y = 4ax^2$, will the tangent make angles with the axis of x, equal to 0°, + 45°, and — 45°, respectively.

The trigonometrical tangent of the angle θ which the geometrical tangent to the parabola at a point (x, y) makes with the axis of x is given by

$$\tan\theta = \frac{dy}{dx} = 8ax.$$

when $\theta = 0$, $\tan\theta = 0$, and therefore $\frac{dy}{dx} = 0$.

$$\therefore 8ax = 0.$$

The only value of x which will satisfy the above expression having any finite value, is $x = 0$. Further, if 0 be substituted for x in the equation to the parabola, it will be seen that $y = 0$. Therefore the tangent at the origin to the above parabola will coincide with the axis of x.

When $\theta = 45°$, $\tan\theta = 1$.

$$8ax = 1 \; ; \therefore x = \frac{1}{8a}.$$

Substituting this value in the equation

$$y = 4ax^2,$$

we get

$$y = 4a\left(\frac{1}{8a}\right)^2 = \frac{1}{16a}.$$

Therefore the tangent to the above curve at the point $\left(y = \frac{1}{16a}\right)$, $\left(x = \frac{1}{8a}\right)$, will make an angle of 45° with the axis of x.

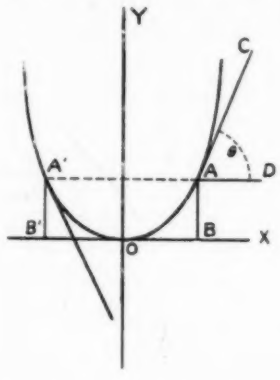
When $\theta = -45°$, $\tan\theta = -1$.

$$8ax = -1 \; ; \therefore x = -\frac{1}{8a},$$

$$y = 4ax^2 = 4a \times \left(\frac{1}{-8a}\right)^2 = \frac{1}{16a}.$$

Hence the tangent to the parabola at the point $\left(y = \frac{1}{16a}\right)$, $\left(x = -\frac{1}{8a}\right)$ will make an angle of −45° with the axis of x.

These two tangents are shown as AC, A′C′ in Fig. 3. Notice



that as we pass from A′ round to A along the curve, the negative angle (which the tangent at all points where x is negative makes with the x axis) diminishes and becomes zero when $x = 0$; whilst the angle which the tangent makes with the x axis now becomes positive, and increases continuously. It should be remembered that a numerical decrease in the value of a *negative* angle is really an increase in the value of the angle which the tangent makes with the positive direction of the x axis.

2. Find the equation of the tangent to the parabola $y = 4ax^2$, at a point whose abscissa is x_1.

(*a*) The tangent will be a straight line, hence, as shown previously, its equation will have the form $y = a + bx$.

(*b*) Since b denotes the tangent of the angle made by this straight line with the x axis, and since the geometrical tangent to the curve at a point whose abscissa is equal to x_1 is found by substituting this value of x in $\frac{dy}{dx}$, we have

$$b = \left(\frac{dy}{dx}\right),$$

when $x = x_1$, $b = 8ax_1$.

$$\therefore y = a + (8ax_1)x \quad (3)$$

will be the equation to the tangent when the proper value of a is substituted.

(*c*) The tangent passes through the point $(y = 4ax_1^2)$, $(x = x_1)$. Substituting these values in (3) we get

$$4ax_1^2 = a + 8ax_1 \times x_1 = a + 8ax_1^2.$$

$$\therefore a = -4ax_1^2.$$

Finally, the required equation of the tangent is given by substituting this value of a in (3). Hence we get

$$y = -4ax_1^2 + 8ax_1x.$$

3. At what point will the above tangent cut the axes of x and y respectively ?

Put $x = 0$, then $y = -4ax_1^2$.

Put $y = 0$, then $x = \frac{1}{2}ax_1$.

4. Show that tangents to the above parabola, at points whose abscissæ are $+ x_1$ and $-x_1$ respectively, will intersect in the axis of y.

5. At what point will a tangent to the above parabola intersect the directrix ?

The equation to the directrix is easily seen to be $y = a$. Substitute this value in equation to tangent, and we get

$$x = \frac{a + 4ax_1^2}{8ax_1}.$$

(To be continued.)

PHYSIOGRAPHY NOTES.

The Doubling of the Canals of Mars. Is it an Optical Illusion?—The origin of the doubling of the canals visible on the surface of Mars has again come to the front, and this time M. Antoniadi has put forward an explanation. His suggestion is that the doubling is only a phenomenon caused probably by the eye of the observer; in fact, it is the result of slight focussing errors when observing these markings. According to M. Antoniadi, a thin line when gradually put out of focus becomes slowly double, the inner parts of which are blurred; in fact, a regular germination is observed. In addition to this, he finds that if several lines be made to cross at a point, all of these do not become double, but only certain of them. Not only do straight markings, but round and elongated spots become alike doubled. Thus if Mars is covered with canals, imperfect vision should render these lines apparently double. Such imperfect vision may proceed (1) from the least error in focussing, (2) from eye fatigue, and that one or other of these two fatal causes of inaccuracy actually does occur very frequently is extremely probable.

M. Camille Flammarion says that M. Adolphe de Bee, of Anvers, in the year 1891 suggested, in a letter to him, that this doubling might be the result of secondary images which, under certain conditions, might be formed in the eye. M. Flammarion is, however, no great believer in this idea, as it does not seem to sufficiently explain all the phenomena of doubling, germination, etc. which have been observed on the surface of this interesting planet, although the arguments brought forward reproduce very ingeniously the greater part of the observations. Perhaps M. Schiarparelli will say what he thinks on this his particular subject.

Mud Volcanoes of Burma.—In an interesting report, Dr. Noetling, paleontologist to the Geological Survey of India, mentions the petroleum-bearing sands and mud volcanoes of Tenangyaung and Minbu. Of the mud volcanoes of the latter place Dr. Noetling writes that they are connected with subterranean petroliferous strata; both volcanoes and mud wells produce a greyish blue mud more or less saturated with petroleum. The low temperature of the ejected mud, seldom as much as 85°, indicates that its source is not deep-seated. The largest had in 1888 a crater about 6 feet in diameter, and this was filled with viscous mud from which there rose enormous bubbles of inflammable gas with a strong odour of petroleum. The temperature was 76°. Some of the other cones rise about 30 feet from the ground. It seems at first difficult to see why mud volcanoes occur at Minbu and not at Tenangyaung, but Dr. Noetling points out that at Minbu these volcanoes arise through fissures in the Tertiary strata beneath an alluvial cover, and he considers that the pressure of gas and petroleum forced a way through this comparatively thin overlying deposit. No fiery eruptions have been recorded; in fact, there are no known instances of spontaneous combustion.

Dr. Noetling traces some connection between the fluctuating height of the river Irawadi and the production of petroleum at the wells. There is also some relation between the activity of the mud volcanoes and the height of the river. The explanation is that during rains the ground-water presses on the petroliferous sands, and it is noteworthy that the main bed of oil-sand is found at about the level of high water of the river. (H. B. W., *Nature.*)

The Eruptions of Vesuvius and the Moon.—M. Sammola has been studying the various phases in the activity of Vesuvius during the eruption that began on the 3rd of July 1895, and still continues, in order to ascertain if there is any connection whatever between the days of greatest lava flow and the phases of the moon. The facts collected during these two years in no way confirm the hypothesis that the lunar-solar attraction acts upon the subterranean lava reservoir as upon the waters of the ocean, in which case the period of greatest volcanic eruption should occur at both full and new moon, and the period of least flow should be that of the first and last quarters.

Has the Moon an Atmosphere?—In measuring the respective positions of two stars, one of which was approaching the dark limb of the moon, M. Comstock found a difference of the three-hundredth of a second of arc as compared with preceding observations. This seems to indicate around the moon the presence of an atmosphere the density of which would be the five-thousandth part of that of the earth's atmosphere. Mr. Pickering had already arrived at the same conclusion by an identical method. The confirmation by M. Comstock renders the question very interesting from a scientific standpoint.

Peculiar Shape of the Shadow of Saturn.—Two drawings made by M. Wonaszek, astronomer at Kis Kastel, in Hungary, on the 1st and 4th of September 1897, show that the shadow made by the planet Saturn upon his rings assumes a concave form, a fact that had already been observed by Schröter, Lassell, De La Rue, and Webb.

A careful examination has shown that this fact is only observable at times when the planet is in quadrature: his shadow appears to us then the largest possible. According to the *Astronomische Nachrichten*, this fact appears to be due to certain irregularities in the mass of the planet's rings; but fresh observations will be necessary to determine the probable periodicity of these phenomena.

CHEMISTRY NOTES.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),
First Class Honoursman in Chemistry (Science and Art Department), Head Master, Finchley School of Science, and Lecturer therein on Chemistry.

The Composition of Ammonia, Sulphur Dioxide, Water, Nitrous Oxide, Nitric Oxide, and Air.—In the *Chemical News* for May 6th Mr. George George, F.I.C., F.C.S., of Allen Glen's School, Glasgow, describes a very simple bit of apparatus for neatly showing the volumetric composition of the above-named bodies. It consists of a bent glass tube connected by means of a piece of thick-walled rubber tubing to a pressure tube. The tube is of Jena glass, and is bent twice at right angles so as to present a short vertical piece (3 in.), an almost horizontal piece at an obtuse angle (3 in.), and a long vertical piece (24 in.) nearly at right angles with the horizontal piece. In the short vertical piece platinum electrodes are sealed; in the horizontal piece is blown a bulb, and the whole is graduated into four equal portions. The upper part of the short vertical limb is closed by thick rubber tubing and a screw clip; the lower portion of the long vertical limb is attached to the pressure tube by thick rubber tubing, which is wired on to prevent slipping.

Mercury is poured into the pressure tube, which is raised so that the mercury rises to the top of the short vertical limb. Ammonia is now run in and decomposed in the usual way. Copper oxide has previously been placed in the bulb that is, in the horizontal bend. This is now heated, and combines with the hydrogen, so that the volume of the nitrogen is very plainly indicated by the rise of the mercury. The apparatus strikes us as very neat. It is on sale at Messrs. Baird & Tatlock's, of London and Glasgow.

The Corrosion of Aluminium.—Prof. Liversedge, of New South Wales, has some nasty things to say about aluminium, which has hitherto been regarded as almost as unoxidisable in air as gold or silver. Prof. Liversidge shows that this is not so—indeed, the best obtainable aluminium is, in respect to oxidisability very little, if any, superior to zinc. Moreover, the metal is acted upon by salt water in such a way as to show the unsuitability of aluminium for torpedo or other boats.

The metal was made into shallow basins so as to catch the rain water, and to give the salts which it might have in solution longer time to act upon it and exposed on the roof of the Chemical Laboratory of the University of Sydney, New South Wales.

The metal very soon lost its brilliancy, and became somewhat rough and speckled with grey spots, mixed with larger light-grey patches; it also became rough to the touch. This incrustation is held tenaciously, and does not wash off, neither is it removed on rubbing with a cloth. The raised parts are probably due to a **hydrated oxide.**

The cups not only did not lose but actually gained in weight, thus one weighing 13·91 grams had increased by ·104 grams; and, even after boiling in water for some hours and rubbing, an increase of ·077 grams was still shown.

To ascertain the effects of **common salt**, a plate of the same metal, 3 × 4 in., and weighing 19·829 grams, was repeatedly dipped in a solution of NaCl and allowed to dry; the alternate dipping and drying were repeated almost daily for three months. The plate lost ·019 gram, and, after washing and rubbing dry, ·059 grams.

Aluminium as a Reducing Agent.—Herr Franck gives the following account of his experiments in this research in the *Chemiker Zeitung*. Aluminium powder contains small quantities of silica and iron, which must be carefully estimated when aluminium is used as a reducing agent. In the purest forms of commercial aluminium Herr Franck shows that there is present 0·8 per cent. of silica and ·34 per cent. of iron. The reducing properties of Al were shown by the following facts:—(1) Phosphorus combines in various proportions with Al: Al_7P_3 obtained as a greyish black infusible mass; Al_3P_3 as a yellowish grey infusible mass; Al_3P and 2 (AlP) as balls of metallic appearance. All these compounds are decomposed by water with evolution of PH_3.

(2.) Al decomposes phosphates at a high temperature, with formation of phosphorus. By the addition of some silicic acid the decomposition is almost quantitative, and according to the equations:—

$$6\,NaPO_3 + 10\,Al + 3\,SiO_2 = 3\,Na_2SiO_3 + 5\,Al_2O_3 + 6\,P;$$

$$3\,Ca(PO_3)_2 + 10\,Al + 3\,SiO_2 = 3\,CaSiO_3 + 5\,Al_2O_3 + 6\,P.$$

(3.) Al decomposes CO_2 according to the equation

$$3\,CO_2 + 4\,Al = 2\,Al_2O_3 + 3\,C;$$

and CO according to the equation

$$3\,CO + 2\,Al = Al_2O_3 + 3\,C.$$

During all these reactions some aluminium carbide is formed.

(4.) Al is both a good and a sure reducing agent, for it decomposes metallic oxides, forming the metal and Al_2O_3; it decomposes sulphates forming sulphur and sulphides and chlorides forming the metal.

(5.) A mixture of aluminium powder and sodium peroxide moistened with water burns spontaneously, with dazzling light.

A Double Iodide of Pb and K—a test for Water.—Mr. F. C. H. Brooks, of Chartered Towers, Queensland, thus describes the preparation of the double iodide: One gram of lead nitrate is dissolved in 10 c.c. of distilled water. A saturated solution of KI is then added until the precipitate is just dissolved. The solution is allowed to stand for a few minutes, when a copious crystalline precipitate of the double iodide falls. The supernatant liquor is quickly poured off, and the precipitate shaken for a few minutes with about 10 c.c. of absolute alcohol. This removes any excess of KI from the double iodide, the latter being insoluble in alcohol. The alcohol is then poured off, and the salt quickly dried with filtering paper. It should be preserved in a stoppered bottle over calcium chloride.

When brought into contact with water, the double iodide at once decomposes as follows:—

$$PbI_2, 2KI = Pb_2 + 2KI.$$

The action of the water appears to be catalytic, unless a hydrate of KI is formed, which decomposes upon evaporation, thus:—

$$PbI_2, 2KI + xH_2O = PbI_2 + KI, xH_2O.$$

So easily is the double iodide affected by moisture that, when exposed to the air of a room for a few minutes, it begins to decompose, as is evidenced by the fact that it loses its natural almost white colour and becomes distinctly yellow. When gently heated it also becomes yellow, but it resumes its original colour on cooling. Heated more strongly, it is partially decomposed, iodine vapours appearing.

Action of Mercury on Cold, Concentrated H_2SO_4.—The opinion of Messrs. Baskerville and Miller that cold, concentrated H_2SO_4 is decomposed by Hg, as previously reported in this page, having been traversed, the authors have again submitted the matter to experiment, and find that whereas the concentrated acid of about 95 per cent. strength is not so decomposed, that of 99·5 per cent. strength is undoubtedly decomposed, the SO_2 given off in 24 hours sufficing to bleach a very dilate $K_2Cr_2O_7$ solution. After a longer exposure to the action of the Hg, the H_2SO_4 gave off SO_2 in sufficient quantity for its presence to be known by the characteristic suffocating odour.

Detection of Carbonic Oxide in the Air.—The presence of carbonic oxide in the air, even when in very small quantities, can easily be detected by passing the vitiated air in very fine bubbles through a dilute solution of chloride of palladium. Ten c.c. of a solution containing one gram of the chloride, acidulated with two drops of HCl, are placed in a special flask, through which the air can be drawn; when the apparatus is started, no matter how small a quantity of carbonic oxide is present, the chloride is decomposed, and the palladium is deposited in a blackish film on the sides of the tube. This deposit points to the presence of a reducing agent. The proportion of the gas present can be estimated by colorimetric means, by comparing the colour of a solution which has been tested with that of a similar solution of known strength which has not been so treated. The authors do not claim great chemical accuracy for this new method, but they think it will be of value from the hygienic point of view on account of its speed.

A Double Carbonate of Soda and Protoxide of Chromium.—M. Bauge reports to the Bulletin de la Société Chimique de Paris as follows:—If to a well-washed and still damp chromium acetate we add a solution of carbonate soda in boiled water, we see that the acetate immediately goes into solution, and that almost immediately a reddish-brown body is precipitated. This precipitation must be carried on in an atmosphere of carbonic acid perfectly free from oxygen. This sodic chromous carbonate forms two hydrates, one containing 10 molecules and the other 1 molecule. The former is a reddish-brown powder, showing lozenge-shaped crystals under the microscope; it is an energetic reducing agent; it decomposes water below 100°, giving off hydrogen. In vacuo it loses water at the ordinary temperature; at 100° it forms the 1 molecule hydrate. Dilute sulphuric and hydrochloric acids dissolve it, giving blue solutions. The salt with 1 molecule of water is a yellow powder, with very similar properties to the other one; heated in vacuo or in a current of hydrogen it changes colour to a dark brown, becoming yellow again on cooling. Cold boiled water gradually changes it into salt, with 10 molecules of water; when heated in a current of chlorine it gives chloride of chromyl. Analyses give these two compounds the following formulæ:—

$$CO_3\,CrCO_3\,Na_2\,10H_2O,$$
$$CO_3\,CrCO_3\,Na_2\,H_2O.$$

Dissociation of Ammonium Chloride.—In a paper contributed to the Chemical Society, Mr. H. B. Baker, M.A, refers *inter alia* to the dissociation of NH_4Cl, a redetermination of which he has made by Dumas' method. When the bulb was protected from the outer air by a phosphorous pentoxide tube terminated by a long capillary, the density of 28·8 was obtained from the dried ammonium chloride, confirming the author's conclusion, based on six determinations by Victor Meyer's method, that dried ammonium chloride does not dissociate at 35°.

Hydrogen and Helium liquefied by Professor Dewar.—On Tuesday, May 10th, Professor Dewar obtained about 100 c.c. of liquid hydrogen, and afterwards proceeded to liquefy Helium. The boiling point of liquid Helium is —240. Its density is 0·6, which agrees with Professor Dewar's determination from Helium occluded in palladium, made 25 years ago. The air contained in a test tube immediately solidified when the tube was immersed in the liquefied hydrogen. Although Helium has been obtained as a sort of mist, to Professor Dewar belongs the honour of having produced liquid Helium without a shadow of a doubt, and in quantity.

REPLIES TO SCIENCE QUERIES.

Dum Spiro Spero.—What is the use of the metal sole of an electrophorus? Would the electrophorus be as effective without one—would it be as effective if placed on an insulator as otherwise?

When the surface of an ebonite electrophorus is beaten with a catskin, it becomes electrified. Its surface electrification is not easily altered (supposing everything to be dry), since the ebonite being an insulator, if any point on it is touched with a conductor, and so discharged, electricity cannot flow to it from neighbouring parts of the surface. Lines of force may be considered to pass from the electrified surface, part through the air, but most through the ebonite to the metal sole (Fig. 1), the latter being supposed connected with the earth.

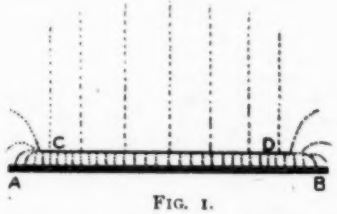


FIG. 1.

Charged Electrophorus. AB = sole. CD = surface, electrified by beating with catskin. Dotted lines show distribution of lines of force when sole is put to earth.

If the surface were raised to too great a potential, electricity would tend to escape by a brush discharge. The presence of the sole reduces the potential due to the surface electrification, since the whole system forms a condenser; hence a greater charge may be accumulated on the surface due to the presence of the sole. Further, this reasoning shows that the thinner the ebonite slab is the greater will be the accumulation of electricity on its surface, until such a thinness is reached that electricity tends to pass through it by conduction.

When now a metal plate is placed immediately above the electrified surface, no appreciable effect is produced, unless this plate is touched with the hand, or otherwise put in connection with the earth; two equal and opposite charges are produced on its opposite surfaces; or, to state it differently, all the lines of force leaving the electrified surface and entering one side of the metal plate pass out from the plate on the other side. When the plate is touched the charge on its surface remote from the ebonite plate passes to earth, or the lines of force leaving the plate run into the body of the person touching the plate and so disappear, the body being a conductor. If the hand is now removed, the metal plate will possess a charge equal in amount and opposite in sign to that possessed by the ebonite surface. Since the efficiency of an electrophorus will depend on the magnitude of the charge which can be produced in this manner on the metal plate, the above reasoning shows that its efficiency is increased by the presence of the metal sole.

It will be seen from the above reasoning that no increase of efficiency will be gained unless the sole is put in connection with the earth. If this is not the case, the lines of force will find no more direct path by passing through the ebonite than through the air. In the same manner a Leyden jar cannot be charged from a knob of an electrical machine unless one of its coatings is put to earth.

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LONDON SCHOOL BOARD AND TECHNICAL AND SECONDARY EDUCATION NOTES.

The last three months' work. The School Board for London has set itself heartily to the work for which it was elected, and although there is not perfect unanimity in the ranks of the Progressive party as to the course which it is preferable to take, yet the work is steadily being accomplished. The record shows that during the past three months many questions of educational importance have been pushed forward. The freeing of the Evening Schools has been accomplished. The opportunities for this continued education are to be made known by posters, leaflets, and circulars. In planning new schools for higher work there is to be a class-room for 40 and two others for 48 or 50 instead of for 60 or 70 children as at present. The byelaws have been revised, and the standard of total exemption raised to the seventh with the sanction of the Education Department. Questions affecting the incidence of taxation, the inspectorate, salaries, and accommodation, have been discussed with good prospects of benefit to education in the years to come.

£100,000 a year for improvements. Many of the older schools of the Board examined in the light of latter day knowledge and experience were notoriously ill-planned and otherwise defective. Immense rooms, insufficient staircases, bad cloak rooms, deficient sanitary requirements, and poor playgrounds mark many of these schools. The process of alteration and improvement has been going on at a slow rate for some years. It is now proposed, however, to set apart £100,000 a year for the purpose, and in the course of the next few years we may hope to see the majority of them brought up-to-date, to the advantage of both teachers and scholars. Sir Charles Elliott, Mr. E. Flower, M.P., and Rev. J. H. Rose were among the Moderates who supported this expenditure.

Incidence of Taxation. Considerable attention during the election was devoted to the amount of the School Board Rate, and to the incidence of taxation. Two valuable memoranda were prepared by Dr. Macnamara and Mr. Morgan-Browne respecting this subject, and they have been appointed by the Board to appear before a committee which is sitting for the purpose of pointing out the increased expenditure on special subjects of instruction imposed by the Legislature, to urge the selection of new sources of revenue and the necessity for larger imperial contributions to the work of the Board.

Inspection under the Board. The Board recognises the need for the highest standard of efficiency in its schools. To this end it appoints the best teachers it can obtain. Only a very small percentage of its staff are learners of the art, upwards of eighty per hundred being fully certificated and possessing many other qualifications. The Board does not rest content with this, but appoints a great number of specialists in the shape of Inspectors, Superintendents, Instructors, and the like. Some of the Progressive members think this is carried too far, and when on the 2nd April a proposition to appoint two additional Inspectors came up for approval, it was referred back to define their duties. Eventually on the 6th May the Board passed the resolution to appoint.

Duties of Inspectors under the Board. For the benefit of those of our readers who may on some future occasion be desirous of entering the ranks of the Board's Inspectors, we print here the schedule of duties as assigned by the School Management Committee. They are multifarious enough, if nothing else.

> 'To visit the Day Schools of the Board and to be well acquainted with the staff so as to be in a position to advise the School Management Committee as to all details connected with their management, and to report upon the members of the teaching staff. To report specially on all new teachers at the end of their year of probation, and for that purpose to observe their teaching carefully. To be well acquainted with the Pupil Teachers' Schools, and to see that the pupil teachers are duly trained in the art of teaching in the day schools. To report periodically on the staff required for efficient education in all schools assigned to them. To advise on all disputed questions as to promotions, etc., arising between head teachers of different departments. To arrange for the transference of teachers when ordered by the School Management Committee. To examine and report upon Private Adventure Schools asking for Government recognition. To advise the Board when any adverse comment is made by Her Majesty's Inspectors on the work of any school, or of any class. To conduct inquiries, if necessary. To keep themselves abreast of the progress of education in London and elsewhere. To report upon the educational questions raised by plans of new schools, alterations and improvements, etc. To advise the School Management Committee on the various questions which come up from time to time in connection with the Code, and with improvements in the curriculum. To report upon the religious instruction in the schools, to superintend the annual Scripture Examinations of scholars and pupil teachers, and to examine the papers and report thereon; and generally to advise the School Management Committee on any questions of method, apparatus, or administration which the School Management Committee may refer to them.'

The Kindergarten System. The Board insists upon all the teachers of infant departments possessing a knowledge of the kindergarten system in theory and practice. It also sets a high standard of qualification for teachers. It now refuses to accept the certificates of those training colleges which do not show that the students have received a systematic course of instruction of not less than twenty-four lessons, and which do not provide for the examination of the students by at least one independent examiner. So assistants in infant schools are required to attend lectures and demonstrations by the superintendent of method in kindergarten. For two years the position has been vacant, but at a recent meeting it was agreed to fill it up by the appointment of a specialist, at a salary of £250 to £300 a year, the post of assistant superintendent being done away with.

Feeble-minded Children. There are probably some 8,000 of these in London unfit to attend ordinary schools, yet not sufficiently defective to be sent to an asylum for idiots. Some, too, are physically defective. The Board provides for these children in small schools in different parts of the metropolis. Mrs. Burgwin, well known to most of our readers, is the superintendent; but so great is the need for constant attention to individual cases that the Board have decided to appoint two medical practitioners (one of whom must be a woman) to give half their time to the examination of these children. The lady practitioner will also be examiner to those pupil teachers and mistresses who express a wish to be so examined, a reform which many women have for a long time desired.

Head Teachers of two Departments. A case directly affecting the interests of the women teachers under the Board came up for decision a short time ago. A recommendation had been made by the School Management Committee to appoint a head master to superintend both the senior and the junior departments of a mixed school. There were no considerations of a special character affecting these schools which will not apply with equal force to every set of schools under the Board where there is a junior department. The ex-teachers on the Board strongly protested against the recommendation as uneducational in the sense that the head master could not become acquainted with the children, as unprofessional, stopping the flow of promotion, as unjust to the assistant in charge of the mixed junior, who would have the responsibility without the status of a head teacher. The combination was effected, and the next day the School Management Committee sent up a recommendation that the practice of combining schools should not be carried out unless in very special cases!

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FRENCH COMPETITION.

Prize Editor:

W. T. THOMPSON, B.A. (LOND.),
FRENCH AND GERMAN HONOURS.

RESULT OF THE APRIL COMPETITION.

The prize is awarded to '*Piocheur*,' the pseudonym of Mr. A. E. Styler, Christchurch Schools, Purley, Surrey.

First Class.—Demoneccio, Picot, Trudchen, Nomen, Helm Crag, Nairnissmo, Josephus, Hymen, Galloise, Land o' the Mountain, H. Euch, Camelot, Tours, Gretchen, Ashton, Integer, Louisa, Perce-neige (Dumbarton), Era, C.E.M., Vere novo, Percy Vere, Rudolph, Pauline, Truro, Chrysostom, Indoctus, Yrt, Kettering, Sea, Carissima mia, Malgré tout, Ziska, Fertilis, Alifer, Spring, Troisième classe, Christmas rose, Beginner, Corinne, Spero, Mary Martha, Floreat Etona, Semper fidelis, Mab, Vindex, Agaznog, Emile, Morven.

Second Class.—Balmoral, Constantia, Ouvrier, Cui bono?, Connemara, Aberdonian, L'anglaise, Ultima Thule, Hoblyn, Treherbert, Gouvernail, D.R., Robin (Cahors), Senrac, Pelican, Hirondelle, Heather Bell, Heather, Trilby, Effie, Listowel, Celandine (Gt. Ormsby), Dominica, Enid, Lac, Fanita, Elsa, Dies, Helvetius, Trianon, Stars and Stripes, Scallywag, Savenay, Jack, Rusticus, Snowdrop, E.S.W., Laurel, La violette, Fido, Robin (Tavistock), Stapleford, Perce-neige (Whittingeham), Alaric, True Blue (Paignton), Schoolmistress, Marius Curtius, Solomon, Semper eadem, Teragram, Glencoe, Sally, Beatrix, Elryc, Luda, Edna.

Third Class.— ——, Prudence, Pickles, True Blue (Kegworth).

Prize Translation.

Although they walked very slowly, they arrived at the *mairie* a full half-hour too soon; and, as the mayor was late, their turn only came about eleven o'clock. They sat waiting in the corner of the room, gazing at the lofty ceiling and the bare severity of the walls, speaking low, and drawing back their chairs with excessive politeness whenever a clerk passed. Still, they abused the mayor, in undertones, as a lazy fellow; but when that magistrate appeared, they rose respectfully. They were requested to sit down again. Next, they witnessed three marriages, hidden in the throng of three smart wedding parties, with brides in white, little girls with their hair frizzed, pink-sashed young ladies, unending processions of gentlemen and ladies dressed in their best, and looking very respectable and correct. Then, when they were called, they almost missed being married after all, for Bibi-la-Grillade had disappeared. Boche found him down in the square smoking a pipe And the formalities—the reading of the Code, the usual questions, the signing of the documents,—were dispatched so briskly, that they looked at one another, considering themselves robbed of a good half of the ceremony. Then all bent earnestly over the register, where they traced their names in great clumsy letters—except the bridegroom, who made a cross because he could not write. They each gave twopence for the poor. When the clerk delivered to Coupeau the marriage certificate, the latter, at a nudge from Gervaise, decided to produce a further donation of twopence-halpenny.

PIOCHEUR.

REPORT ON THE FRENCH COMPETITION FOR APRIL.

THE quality of the papers sent in was decidedly above the average. The expression *sur leur trente-et-un* puzzled a good many competitors, who took it as meaning 'verging on thirty-one years of age.' It means 'dressed in perfect style.' Beyond this phrase there were no expressions which proved to be general stumbling-blocks. One competitor translates *leur tour vint seulement vers onze heures* as 'their trip lasted only eleven hours.' 'If frankly they regarded them as such, they believed the flight to be a good motive of the ceremony' is an imaginative but not very luminous rendering of *furent expédiés si rondement*, etc. *Lorsque le garçon remit à Coupeau le certificat de mariage* is somewhat humorously rendered as 'Whilst the boy replaced the certificate of marriage in the Coupeau.' For humour, however, 'They decided to go abroad again with a company of five' as a rendering of *se décida à sortir encore cinq sous* runs it very close.

A Prize of One Guinea will be given for the best translation into English of the following extract:—

'On redevient sauvage à l'odeur des forêts' a dit un poète contemporain. Cette maxime paraîtra peut-être contestable à ceux dont le courant tumultueux des grandes villes a bercé l'enfance et agité la jeunesse, mais elle est rigoureusement vraie pour quiconque a été élevé au milieu des forêts. Ce qui nous prend et nous charme, nous autres *boisiers*, ce n'est pas seulement l'originale beauté de ces nappes de verdure ondulant de colline en colline; ce n'est pas la fière tournure des chênes centenaires, ni la limpidité des eaux ruisselantes, ni le calme des futaies profondes; non, c'est par-dessus tout la volupté des sensation d'autrefois, ressaisies tout à coup et goûtées à nouveau. L'odeur sauvage, particulière aux bois, la trouvaille d'un bouquet d'alises pendant encore à la branche, ou d'une fleur perdue de vue depuis des années, le son de certains bruits jadis familiers:—la rumeur d'une cognée dans les *coupes* lointaines ou les clochettes d'un troupeau vaguant dans une clairière,—toutes ces choses agissent comme des charmes pour évoquer les esprits élémentaires qui dorment au fond de l'homme cultivé. Alors l'habit de théâtre que nous revêtons pour jouer notre rôle dans la comédie de la vie civilisée et raffinée, ce vêtement d'emprunt aux couleurs voyantes, aux étoffes précieusement brodées et artistement taillées, se déchire de lui-même et s'en va par lambeaux pendre aux buissons de la route. L'homme primitif reparaît avec la souplesse de ses mouvements naturels, la soudaineté de ses désirs, la naïvete de ses étonnements enfantins. Plongé dans ce bain des verdures forestières, il sent sourdre en lui une sève remontante; et dans son imagination rajeunie, les féeries du temps passé se remettent à chanter leurs contes bleus.

ANDRÉ THEURIET.

GERMAN COMPETITION.

RESULT OF THE APRIL COMPETITION.

The prize is awarded to '*Anhalt*,' the pseudonym of Mrs. Adam, 1, Brunswick Street, Edinburgh.

First Class.—Ritter, Piocheur, Habsburg, Martha Schlaffke, Wallenstein, Corinne, Aberdonian, Nellie, Demoneccio, Beginner, Xie, Philomène, S.H.C.J., Trilby, Hirondelle, Connemara, Gretchen, Era, Nairnissmo, Cycloid, Weimar, Jock o' Hazeldean, Celandine (Fenton), Pelican, Floreat Etona, M.E.R., Elsa, Trotzdem, Carissima mia, Strassburg, Cui bono?, To gaïdouri, Tours, Lac, Tom Thumb, Integer.

Second Class.—C.E.M., Leben Sie wohl!, Quatsch, Tycho, White Bunny, Irma Eilimé, Thekla, Thistle, Grete, Heather, Dies, Edelweiss, Helvetius, Dai Ta-lung, Northumbrian, Morven, Agaznog, Mac, Hajji Baba, Florabel, Fertilis, Snowdrop, Rusticus, Celandine (Great Ormsby).

Prize Translation.

Rudolph II. was not without virtues, which, had his lot been that of a private gentleman, might have won for him the love of mankind. His disposition was mild; he loved peace, and was passionately devoted to the sciences, especially astronomy, physics, and chemistry, as well as to the study of antiquities.

It was Germany's evil genius that gave to it a Rudolph as emperor, just at this critical epoch, when only a strong arm and a prudence capable of yielding could save the peace of the empire.

In a more peaceful period the German body politic might have saved itself, and Rudolph, like so many others of his rank, might have hidden his weaknesses in the dimness of obscurity. The urgent need of the virtues which he lacked forced his incapacity to show itself. Germany's condition demanded an emperor who could, by means of his own resources, give weight to his decisions, and Rudolph's hereditary states, considerable as they were, were in such a condition as placed the Regent in extreme embarrassment.

ANHALT.

REPORT ON THE GERMAN COMPETITION FOR APRIL.

There is an increase in the number of competitors, and the quality of the translations sent in is very high. Several competitors rushed at *den Wissenschaften* and translated it as an accusative governed by *liebte* instead of as a dative plural depending on the somewhat distant verb *ergab*. It was almost to be expected that the *mächtiger Arm*, which the historian considered as necessary for an Emperor of Germany at the epoch to which the extract refers, should have been by some translated as 'mailed fist.' Such a translation might possess a certain appositeness at present, but renderings of this kind are on the whole better avoided.

A Prize of Half a Guinea will be given for the best translation into English of the following extract:—

Adelaide von Weissenfels hatte noch nicht zu Ende gelesen, als der Entschluss in ihr reifte, die hier so freigebig angebotenen neunhundert Mark—auf einen zweiten oder gar dritten Preis reflektierte sie nicht—zu verdienen. Mit dem Glorreichen verknüpfte sie so das Nützliche. In Geldsachen war die Frau Hofrätin ja von Urbeginn über Gebühr zartfühlig. Neunhundert Mark, die ihr so völlig unerwartet als Neben-Einnahme zufielen, dünkten ihr an und für sich schon des Schweisses der Edlen wert und lockten ihre bewegliche Phantasie mit gar entzückenden Bildern. Sie erwog bereits, wie sie den 'hübschen Zuschuss' demnächst verwenden solle und raffte sich zu der Anschauung auf, dass sie zwar etwa drei Viertel des ruhmvoll geernteten Kapitals zinsbar anlegen, den Rest jedoch im Jubel über den frisch erkämpften Lorbeer rückhaltslos einem Extra-Vergnügen opfern müsse. Das erheischte nicht nur die Dankbarkeit gegen das Schicksal; nein, es war ihr ein unabweisliches Herzensbedürfnis, durch eine ungewöhnliche Ausgabe öffentlich zu bekunden, dass ihr Triumph ein Ereignis von verblüffender Tragweite sei.

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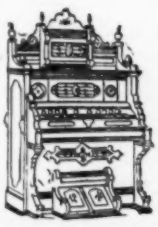

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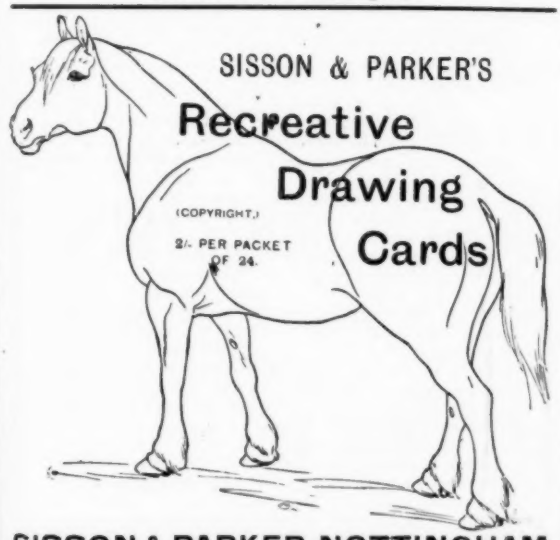

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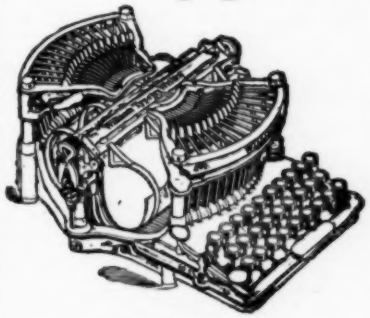

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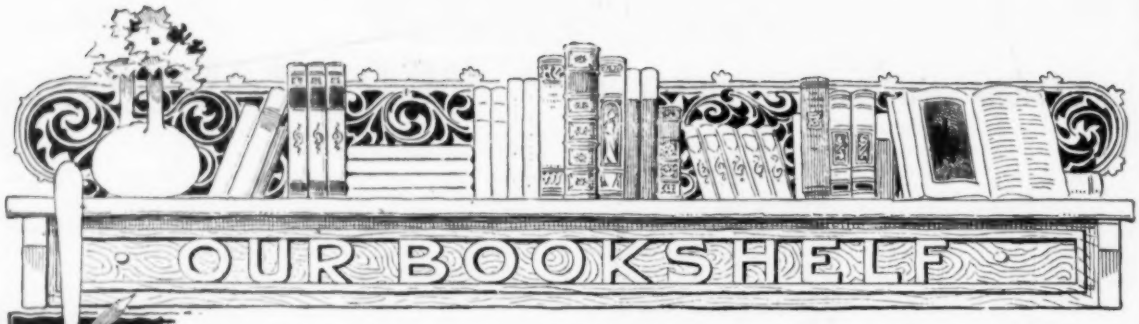

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> 'Ye know that History is half dream—aye, even
> The man's life in the letters of the man.
> There lies the letter, *but it is not he.*'

And in this lies the challenge. To reconstruct the spirit from which the letter emanated, to erect from the mummy of parchment record, the living, breathing man, is a problem at once fascinating—and impossible.

* * * * * *

It has fascinated Mr. Anthony Hope, and he has in Simon Dale, to my thinking, come as near perfection as the limitations of this kind of story permit. He has seized upon the Court of the second Charles, that gilded scene of intrigue, duplicity and profligacy, as the background of his story, and has introduced a crowd of historical characters, Charles, Buckingham, Monmouth, Nell Gwynne, Arlington, Louis XIV.—all of whom are presented to us as real flesh and blood. The modishness of the time lends itself admirably to that extraordinary skill in brilliant dialogue, which is one of Mr. Hope's best graces. Simon Dale is full of dash, discernment and spirit, and he moves gallantly in that atmosphere of political and amorous complication which Mr. Hope loves and creates so deftly. Especially well drawn are Nell Gwynne, the mistress of the King, and Barbara Quinton, the haughty and high-born beauty who is, from the first, intended for Simon Dale. A greater contrast in womanhood than the pair present could hardly be conceived: the one proud, pure, full of feminine perversity and whim; the other a roguish mistress of hearts, not without womanly depths, but a frank voluptuary, witching, easy and complaisant. It is a feather in Mr. Hope's cap that he has played them off with such success. It would be unfair to the author and reader alike to do more than merely outline the course of this admirable story.

* * * * * *

Simon Dale is a young gentleman of fallen fortunes and a child of prophecy. One Betty Nasroth, a reputed witch of his native village, predicted that he 'should love where the King loved, know what the King hid, and drink of the King's cup.' The story concerns itself with the working out of the prophecy. The first step in its fulfilment comes in the year of the Plague, 1665, when one who loved widely, hid much, and drank deeply, sits upon the throne, firm only in his gospel of not going on his travels again. Simon Dale is then in his eighteenth year, a young man of courtly presence, quick wits, extraordinary discretion, unaffected with anything like a retiring disposition, and possessed of a sturdy honesty that stands him in good stead. The plague has driven Nell Gwynne from town, and fate has led her to rusticate in Simon's village. To the chagrin and lofty disdain of Barbara Quinton, daughter of the Lord of the Manor and girl-sweetheart of Dale, the stranger casts her spells over the young man, who philanders in several delightful comedy scenes, and then believes himself hopelessly in love with the King's favourite, whom he knows and worships as Cydaria. How Simon discusses the propriety of his action is seen in the following extract, which affords a good example of Mr. Hope's quiet charm of style.

* * * * * *

> 'The debate is years old; not indeed quite so old as the world, since Adam and Eve cannot, for want of opportunity, have fallen out over it, yet descending to us from unknown antiquity. But it has never been set at rest by general consent; the quarrel over passive obedience is nothing to it. It seems such a small matter though; for the debate I mean turns on no greater question than this: may a man who owns allegiance to one lady justify, by any train of reasoning, his conduct in snatching a kiss from another, this other being (for it is important to have the terms right) not (so far as can be judged) unwilling? I maintained that he might; to be sure, my position admitted of no other argument, and, for the most part, it is a man's state which determines his arguments and not his reasons that induce his state. Barbara declared that he could not; though, to be sure, it was, as she added most promptly, no concern of hers; for she cared not whether I were in love or not, nor how deeply, nor with whom, nor, in a word, anything at all about the matter. It was an abstract opinion she gave, so far as love, or what men chose to call such, might be involved; as to seemliness, she must confess that she had her view, with which, may be, Mr. Dale was not in agreement. The girl at the gardener's cottage must, she did not doubt, agree wholly with Mr. Dale; how otherwise would she have suffered the kiss in an open space in the park, where anybody might pass—and where, in fact (by the most perverse chance in the world), pretty Mistress Barbara herself passed at the moment when the thing occurred? However, if the matter could ever have had the smallest interest for her—save in so far as it had touched the reputation of the village and might afford an evil example to the village maidens—it could have none at all now, seeing that she set out the next day to London, to take her place as Maid of Honour to her Royal Highness the Duchess, and would have as little leisure as inclination to think of Mr. Simon Dale, or of how he chose to amuse himself when he believed that none was watching. Not that she had watched; her presence was the purest and most unwelcomed chance. Yet she could not but be glad to hear that the girl was soon to go back whence she came, to the great relief (she was sure) of Madam Dale and of her dear friends Lucy and Mary; to her love for whom, nothing—no, nothing—should make any difference. For the girl herself she wished no harm, but she conceived that her mother must be ill at ease concerning her.'

* * * * * *

To town go shortly all the parties, Simon to take up a commission in the Life Guards, procured for him, though he is unaware of the fact, by Nell's influence with the King. It is not long before Simon learns the real name and character of his benefactress, and is involved in a duel with Lord Carford, a tool of Louis, and up to the neck in that conspiracy against the religion and liberties of the State, which culminated in the

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infamous Treaty of Dover. As an honest man, Simon, unmoved by the blandishments of his would-be benefactress, appears at Court to resign the proffered commission. There he meets the King, Buckingham, Monmouth, the Duke of York, Arlington, Rochester, and in due course takes his place in that hot-bed of fashionable depravity. An attempt to engage him in the French King's party fails, but secures him the friendship of Monmouth, in whose train he takes service. Dale has already loved where the King loves, he is shortly to learn what the King hides. Already he has stumbled on one-half of the secret, viz., that the King is a Catholic. Before setting out with the Court for Dover, where mysterious preparations are in progress for the reception of the French envoy, Simon seeks Nell and offers her marriage, only to learn that the gem of his calf-love is a very common pebble indeed.

* * * * * *

It is Louis himself who arrives from Calais, and Simon's luck and open eyes make him master of the dangerous secret. Barbara, to whom Dale's heart has inevitably turned, is extravagantly wooed by the young Earl of Monmouth with the cognisance of her avowed suitor, Lord Carford. She attracts the attention, too, of Louis, and the two Kings proceed to an arrangement whereby a lady of the French Court remains to fortify the Catholicity of Charles, while Barbara goes to France with Dale as her putative husband. Dale, of course, lends himself to the nefarious scheme, for the purpose of rescuing his haughty ladylove from the dishonour which threatens her. Before he goes, he drinks of the King's cup in a most dramatic manner. His Ranter servant, who schemes to poison the King, opportunely provides some bottles of wine which find their way to the royal table. The poisoned wine is detected by the King before any harm happens, and Dale is invited, as a test of his innocence, to drink a bumper of his own wine. He is only prevented from bringing the story to an untimely end by Louis, who dashes the cup from his lips. Ultimately, the party embarks for Calais, and in the fog which descends upon them, Dale and Barbara make shift to drop into the pilot's boat which is towed astern. As the last strands of the painter are cut, they are perceived by King Louis, who leaps into the boat after them.

* * * * * *

'He came full on the top of me, and we fell together on the floor of the boat. By the narrowest chance we escaped foundering, but the sturdy boat proved true. I clutched my assailant with all my strength, pinning him arm to arm, breast to breast, shoulder to shoulder. His breath was hot in my face. I gasped, "Row, row!" From the ship came a sudden alarmed cry: "The boat, the boat!" But already the ship grew dim and indistinct.'

'"Row, row!" I muttered; then I heard the sculls set in their tholes, and with a slow, faltering stroke the boat was guided away from the ship, moving nearly at a right angle to it. I put out all my strength. I was by far a bigger man than the King, and I did not spare him. I hugged him with a bear's hug, and his strength was squeezed out of him. Now I was on the top and he below. I twisted his pistol from his hand and flung it overboard. Tumultuous cries came from the blurred mass that was the ship; but the breeze had fallen, the fog was thick, they had no other boat. The King lay still. "Give me the sculls," I whispered. Barbara yielded them; her hands were cold as death when they encountered mine. She scrambled into the stern. I dragged the King back—he was like a log now—till he lay with the middle of his body under the seat on which I sat; his face looked up from between my feet. Then I fell to rowing, choosing no course except that our way should be from the ship, and ready, at any movement of the still form below me, to drop my sculls and set my pistol at his head. Yet till that need came I bent lustily to my work, and when I looked over the sea, the ship was not to be seen, but all around hung the white vapour, the friendly accomplice of my enterprise.'

* * * * * *

'"You were deluding me all the time?" he asked.

"Even so," said I, with an inclination of my head.

"You did not mean to take my offer?"

"Since I am a gentleman, I did not."

"I also am accounted a gentleman, sir."

"Nay, I took you for a prince," said I.

'He made me no answer, but looking round him again, observed:

"The ship must be near. But for this cursed fog she would be in sight."

"It's well for us she is'nt," I said.

"Why, sir?" he asked brusquely.

"If she were, there's the pistol for the lady, and this sword here for you and me," said I coolly. For a man may contrive to speak coolly, though his bearing be a lie and his heart beat quick."

"You daren't!" he cried, in amazement.

"I should be unwilling," I conceded.'

'For an instant there was silence. Then came Barbara's voice, soft and fearful:

'"Simon, the fog lifts!"

'It was true. The breeze blew and the fog lifted. Louis' eyes sparkled. All three of us by one impulse looked round on the sea. The fresh wind struck my cheek, and the enveloping folds curled lazily away. Barbara held up her hand and pointed. Away on the right, dimly visible, just detached from the remaining clouds of mist, was a dark object sitting high on the water. A ship it was—in all likelihood the king's ship. We should be sighted soon. My eyes met the king's, and his were exultant and joyful; he did not yet believe that I would do what I had said, and he thought that the trap closed on us again; for still the mist rose, and in a few moments they on the ship must see us.

'"You shall pay for your trick," he said, between his teeth.

'"It is very likely," said I, "but I think that the debt will be paid to your Majesty's successor."

'Still he did not believe. I burst into a laugh of grim amusement. These great folk find it hard to understand how sometimes their greatness is nothing, and the thing is man to man; but now and then fortune takes a whim and teaches them the lesson for her sport.

'"But since you are a king," said I, "you shall have your privilege. You shall pass out before the lady. See, the ship is very plain now. Soon we shall be plain to the ship. Come, sir, you go first."

'He looked at me, now puzzled and alarmed.

'"I am unarmed," he said.

"It is no fight," I answered. Then I turned to Barbara. "Go and sit in the stern," I said, "and cover your face with your hands."

"Simon, Simon," she moaned, but she obeyed me, and threw herself down, burying her face in her hands. I turned to the king.

"How will you die, sir?" said I, quietly, and as I believe, in a civil manner.

'A sudden shout rang in my ears. I would not look away from him lest he should spring on me or fling himself from the boat. But I knew whence the shout came, for it was charged with joy and the relief of unbearable anxiety. The ship was the king's ship, and his servants had seen their master. Yet they would not dare to fire without his orders, and with the risk of killing him; therefore I was easy concerning musket shot. But we must not come near enough for a voice to be heard from us, and a pistol to carry to us.

'"How will you die?" I asked again. His eyes questioned me. I added, "As God lives, I will." And I smiled at him.'

* * * * * *

Ultimately the innate nobility of the king wins the day; he ascends the deck of his ship, and Dale and Barbara row away to the Dover shore. There is still peril, and the hours of hiding on the sea beach are filled up with a series of exasperating misunderstandings which leave each of the lovers perfectly convinced of the cold indifference of the other. The timely assistance of Nell Gwynne does nothing to heal the breach, and the pair reach Quinton Manor as far apart as ever. The treachery of Carford and the king's resentment at last bring the girl to the arms of Simon Dale. The rest is happy obscurity. Dale refuses the king's proffer of a post at Court, and the curtain rings down upon the conventional happiness of a devoted husband, who nevertheless retains a tender memory of the light-o'-love so irrevocably linked with his youthful adventures.

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England and the Reformation, A.D. 1485–1603. By G. W. Powers, M.A.—The series of Oxford Manuals of English History, of which we have noticed earlier issues, is admirably continued in this little book. The period it covers is one of great interest and importance, and it is treated with the breadth of view, and the due sense of historic proportion which this series aims at exemplifying and encouraging. It will be found well suited for use in schools above the elementary and for young students generally.

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Tit-bits Copy Books, Nos. 1 to 9. We like this series of books better than its title, though that may be defended as appropriate. The sentences given for copying are described as Tit-bits from the Code Subjects—Arithmetic, Grammar, Geography, History, etc. The style of writing is clear and bold, with a slight slope of 15 degrees from the vertical. Every page contains at least two head-lines, and these are carefully selected, so as to keep the writer interested in his work. To all who teach the sloping writing the books may be heartily commended.

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We have received several numbers of Mr. Stead's popular series of Penny Books, including **The King's Last Vigil and other Poems** by Lady Lindsay, and a selection of **Lamb's Tales from Shakespeare,** as well as the four numbers Mr. Robert S. Wood's capital selections of **Poems and Dramatic Selections for the Schoolroom and the Scholar,** all published in the Penny Poets. Six of Lamb's Tales are given, and they are those appointed for the next Cambridge Local Examination.

Recent issues of the **Books for the Bairns,** include **Bunyan's Pilgrim's Progress, Part II., Tales from the Travels of Baron Munchausen, The Tale of a Donkey, Sinbad the Sailor,** and **The Labours of Hercules.** From school experience we know that these penny books are great favourites with the younger children, as many of the more frequently issued **Penny Popular Novels** are with the older ones.

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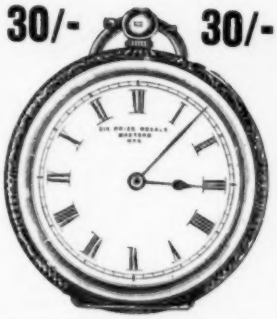

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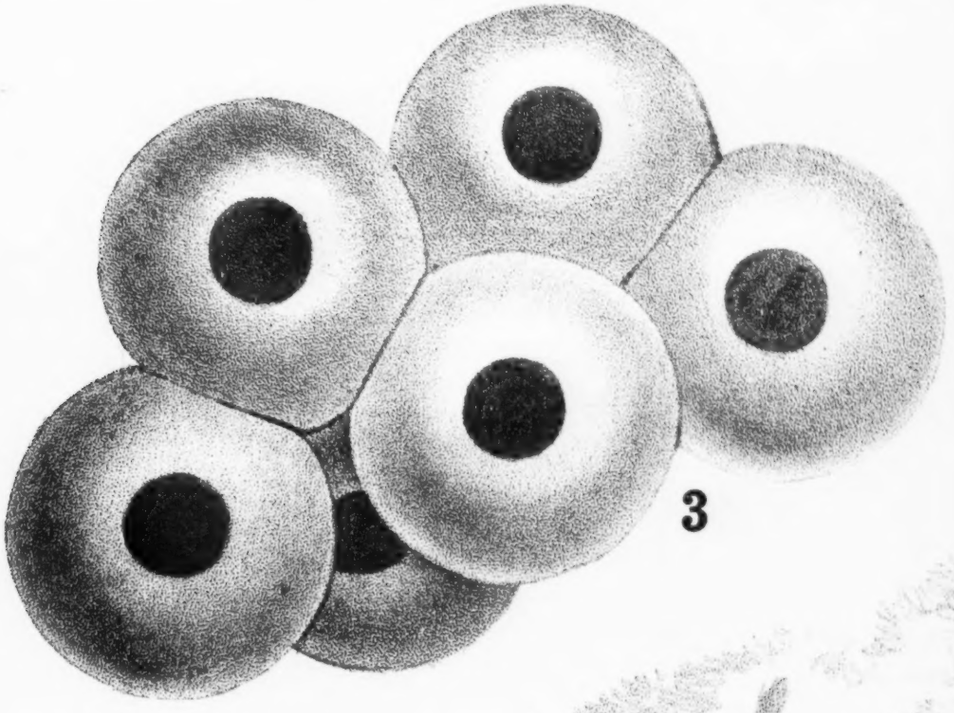

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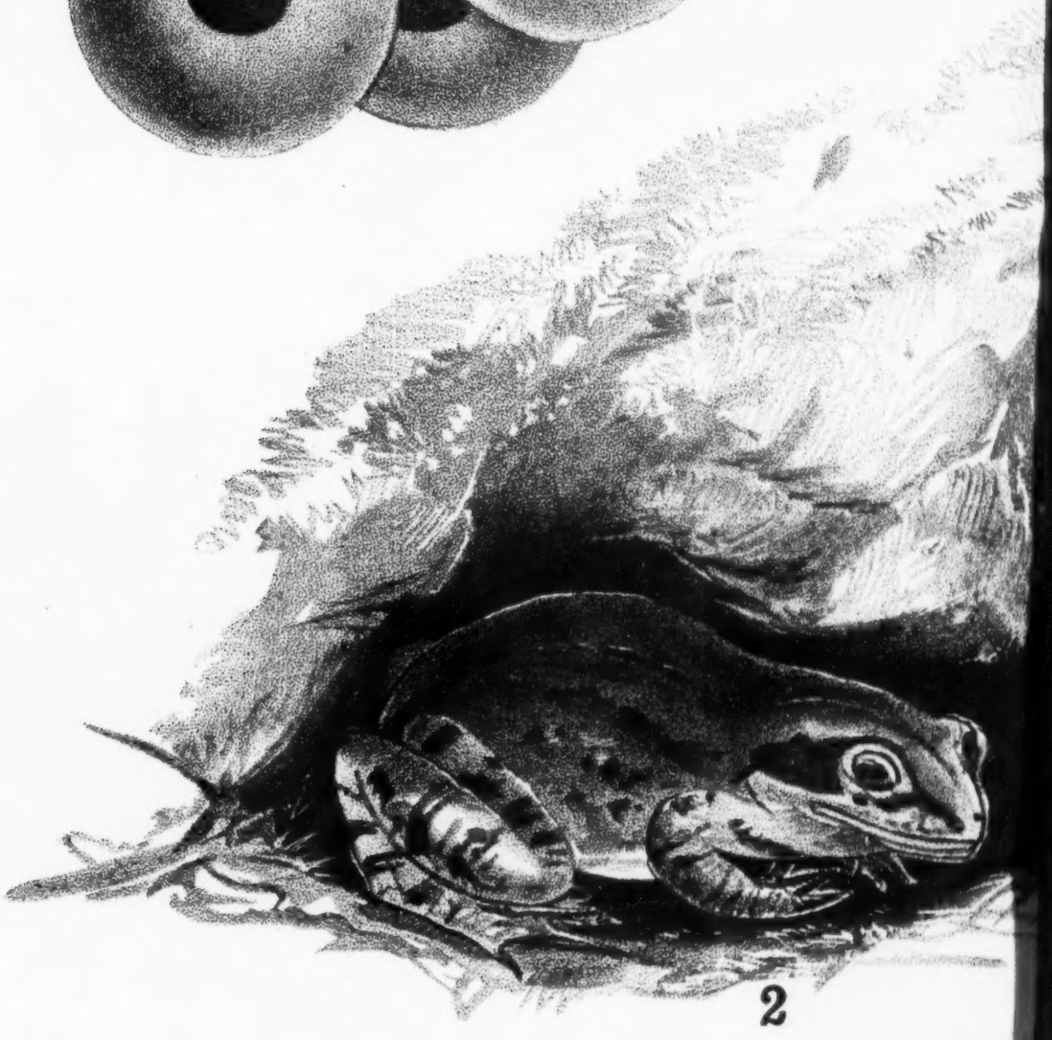

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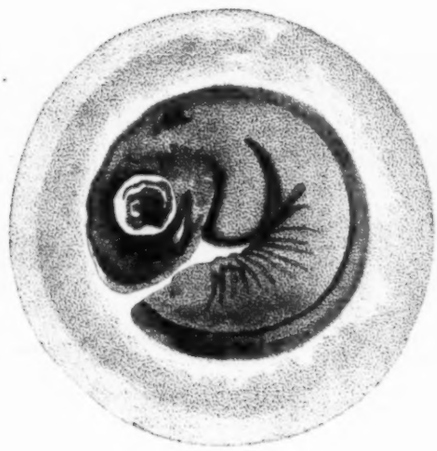

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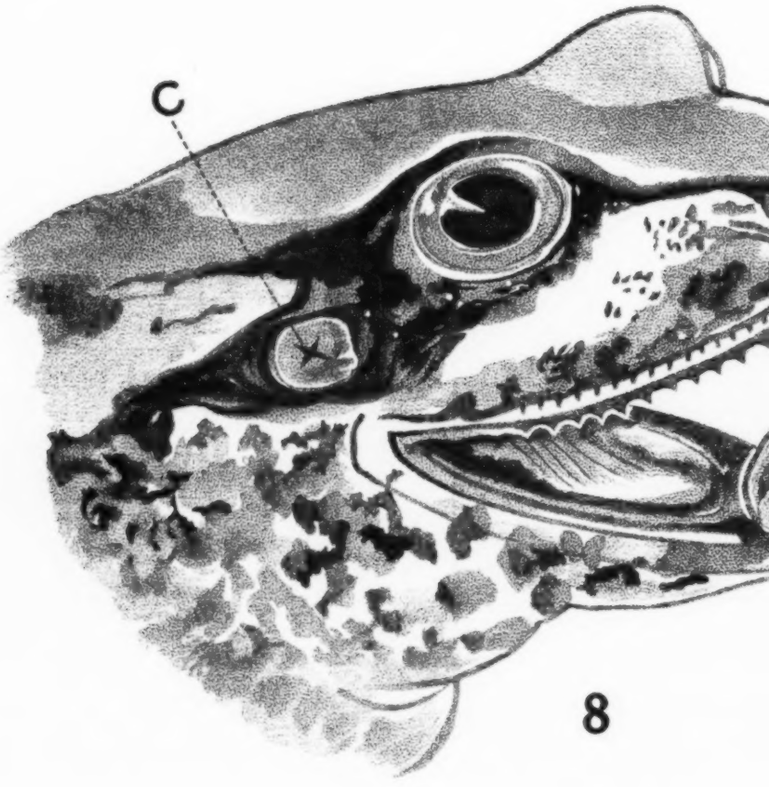

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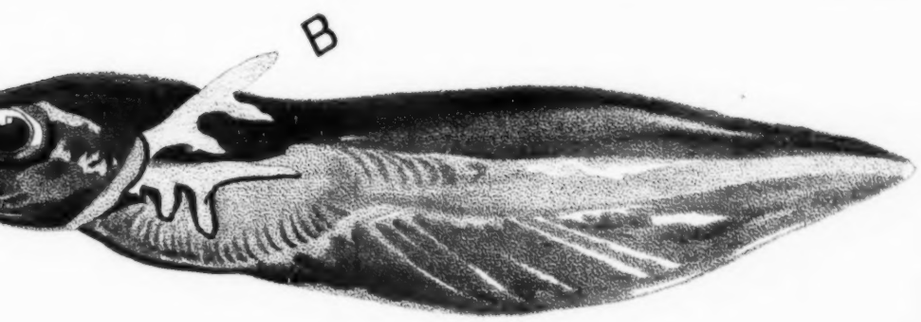

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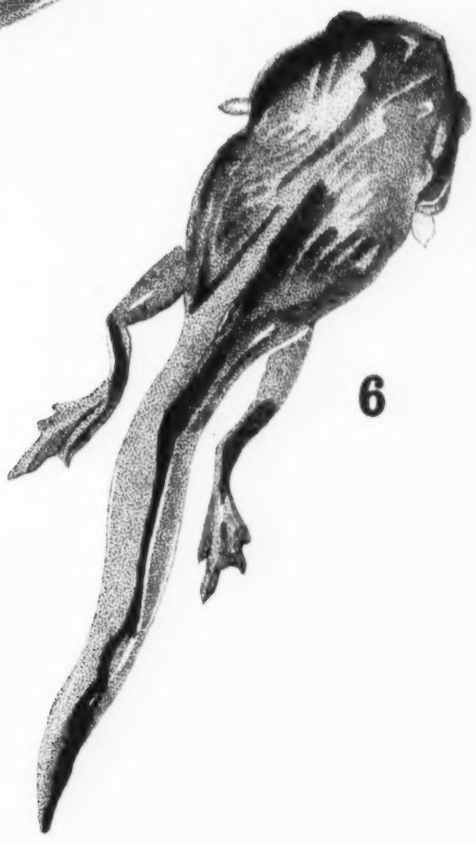

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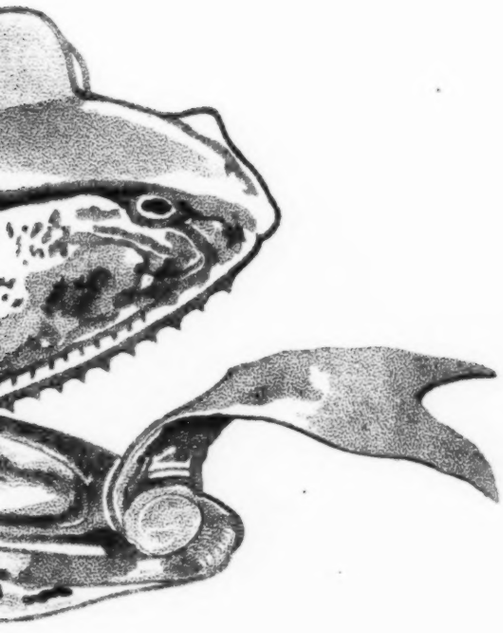

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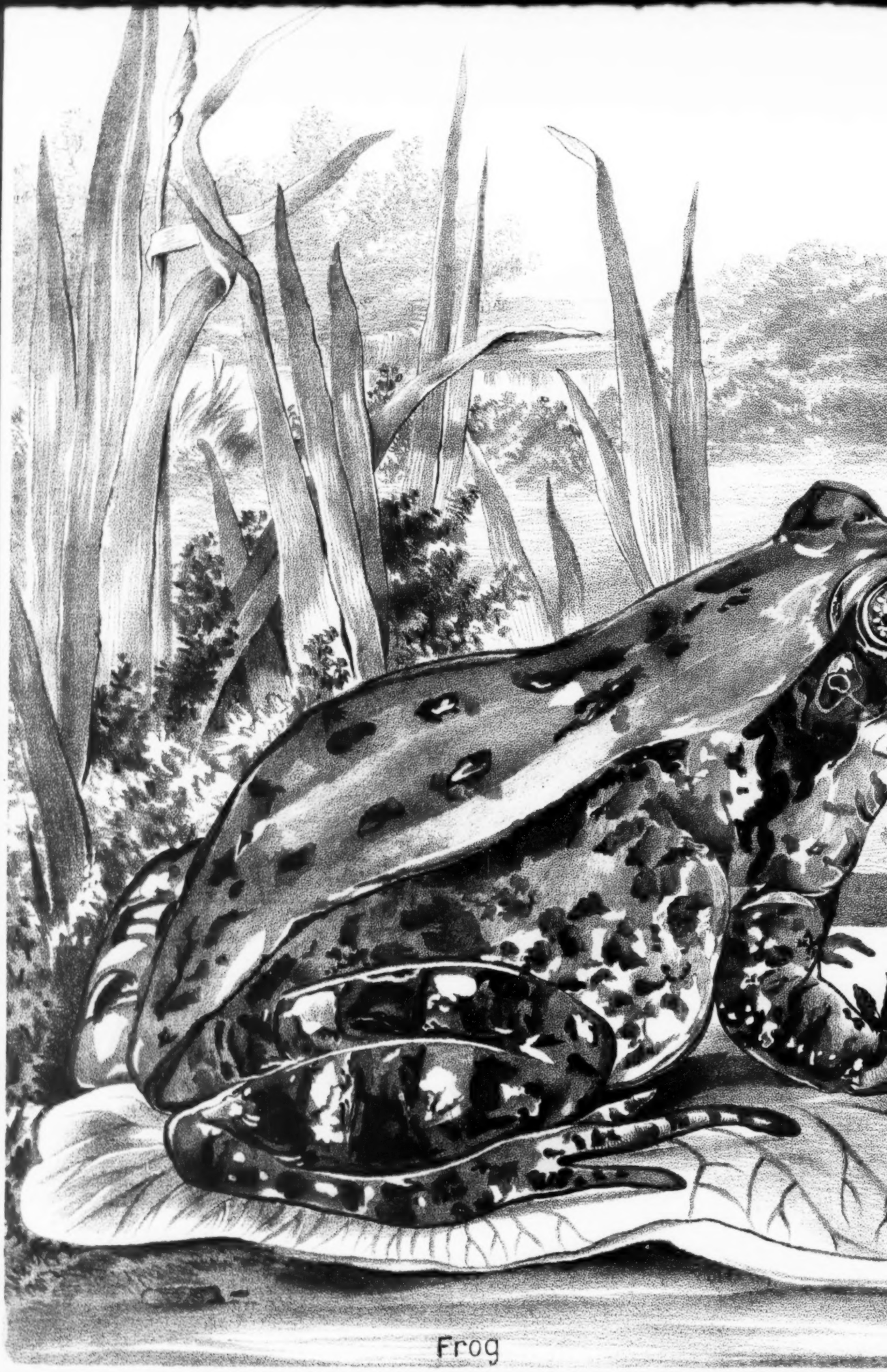
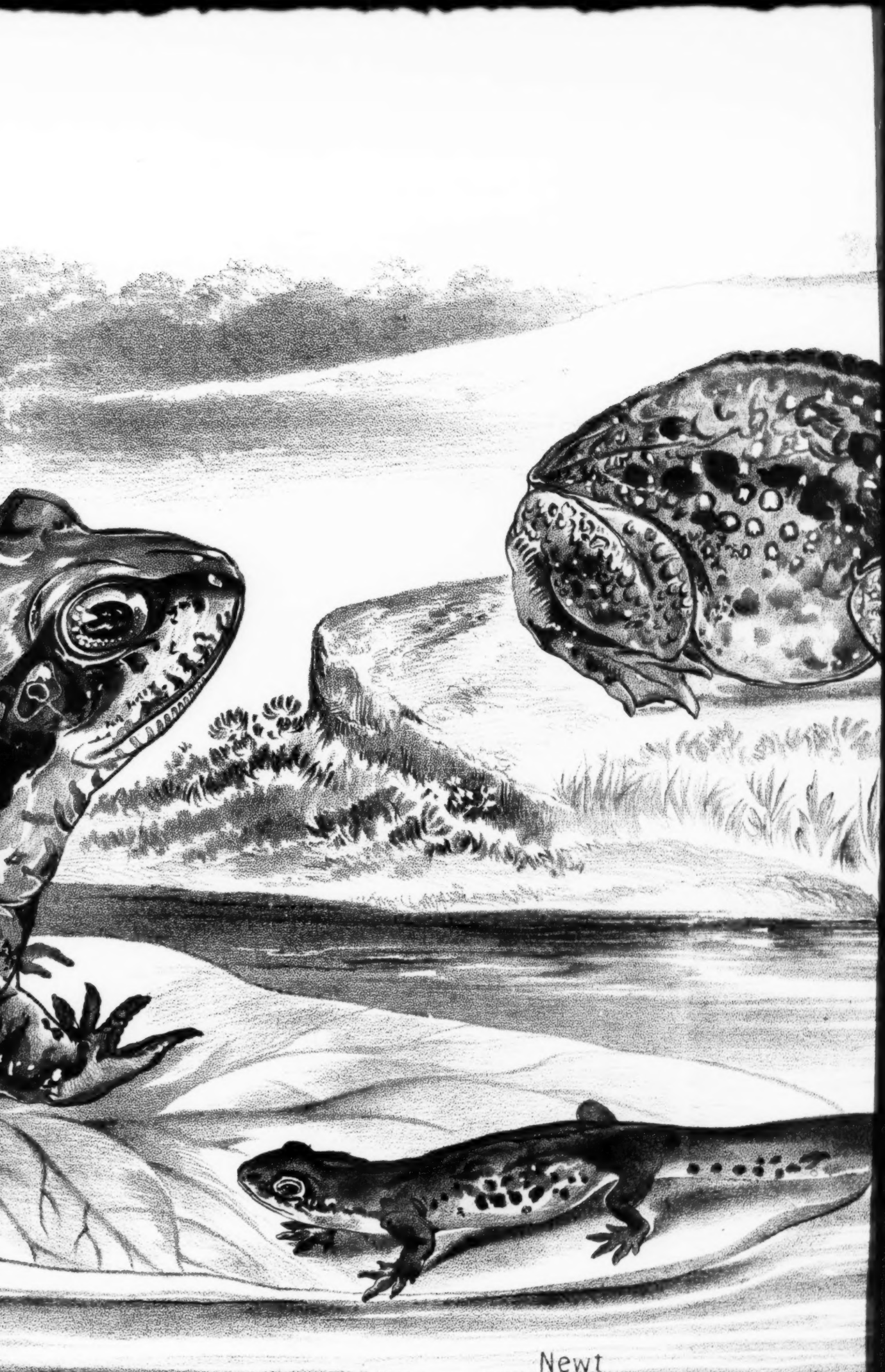
THE FROG,

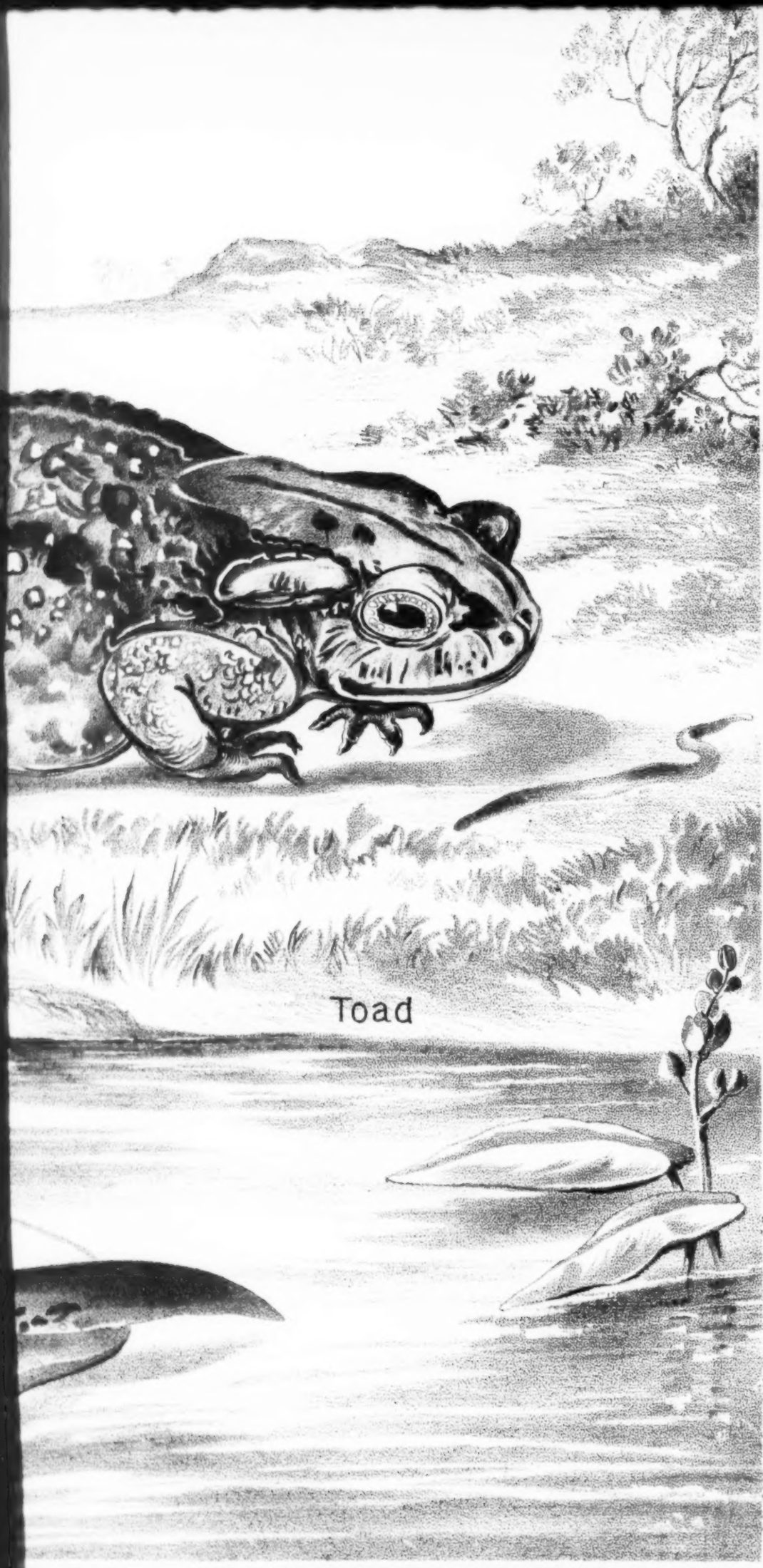
THE TOAD AND THE NEWT



Frog



Newt



Toad

THE FROG,

THE TOAD, AND THE NEWT.

Reference to Diagrams :—

1. **Skeleton of Frog.**
2. **Frog hiding under a stone for hibernation.**
3. **Eggs of Frog, first stage.**
4. **Egg, showing last stage.**
5. **Tadpole, or young Frog, first stage.**
6. **Tadpole, later stage.**
7. **Last stage of Tadpole.**
8. **Head of Frog, showing action of tongue in catching flies, and ear drum (C).**

GENERAL DESCRIPTION OF THE FROG.

Frogs, Toads, and Newts belong to a numerous class of amphibious animals termed Batrachians, some of which have tails throughout life, such as Newts. Frogs and Toads are tailless in the adult form.

Frogs and Toads undergo a series of curious changes before attaining to their adult form. Eggs are first deposited in the water—those of Frogs in masses or clusters, and those of Toads in strings. In a week or two there emerges from each egg a small black creature, apparently all head and tail, and familiarly known as the Tadpole; they swim about freely, and breathe by gills (**5 B**). In a short time small hind legs appear, and the gills become smaller (**6**). A little later the fore limbs grow and the tail becomes very short (**7**). The minute Frog now takes to land and becomes an air-breathing animal, and soon after the tail is entirely absorbed into the body.

The skin of the Frog is always moist and smooth. It progresses by a series of long jumps. The hind feet are partially webbed, and in habit it is largely aquatic. The skin of the Toad is dry and rough, being covered with small knobs. It creeps slowly, and seldom jumps. Its hind feet are fully webbed, but it is more terrestrial, or land frequenting, than the Frog. Frogs and Toads hibernate, or hide under stones or turf or tree roots, during the winter.

The skeleton of the Frog (**No. 1**) is noticeable on account of the absence of ribs (the points marked **A** being extended processes of the vertebræ), the broad, flat head, and the narrow and slender hip-bones. On account of the absence of ribs, the Frog cannot breathe by movements of the chest, as other animals do. It forces air into the lungs by a swallowing movement of the mouth and throat, which may be seen going on continuously while the animal is on land.

Frogs and Toads are mainly insectivorous, but they also eat worms, slugs, and caterpillars. They catch insects by throwing out the tongue, which is attached to the front of the lower jaw, and rapidly withdrawing it—the tongue being provided with a sticky secretion to which the insects adhere.

The Newt, though undergoing similar changes to those of the Frog and the Toad, retains its tail throughout life. It seizes its food with its jaws in the ordinary way, and it lives almost entirely in the water, though breathing air.

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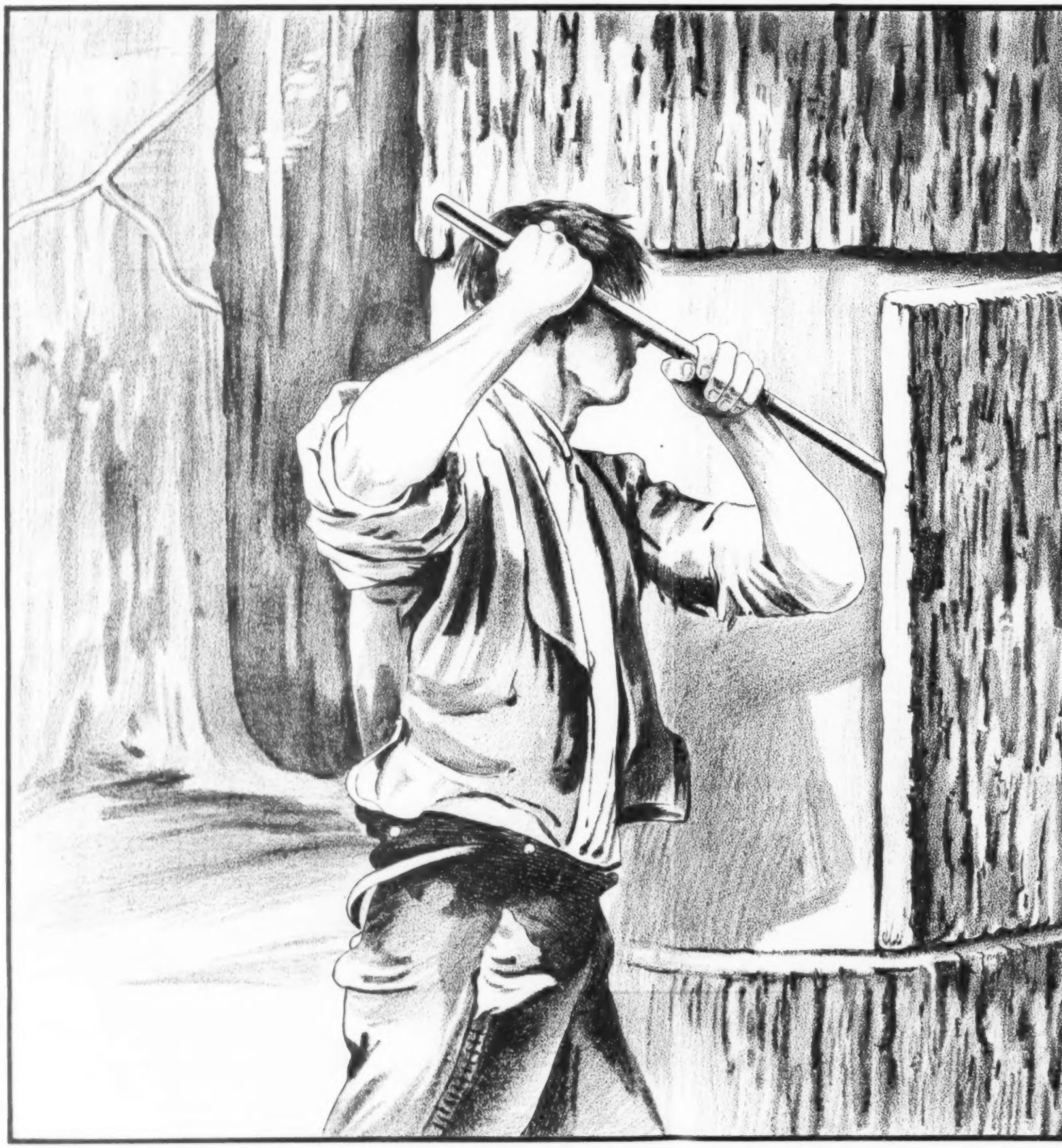

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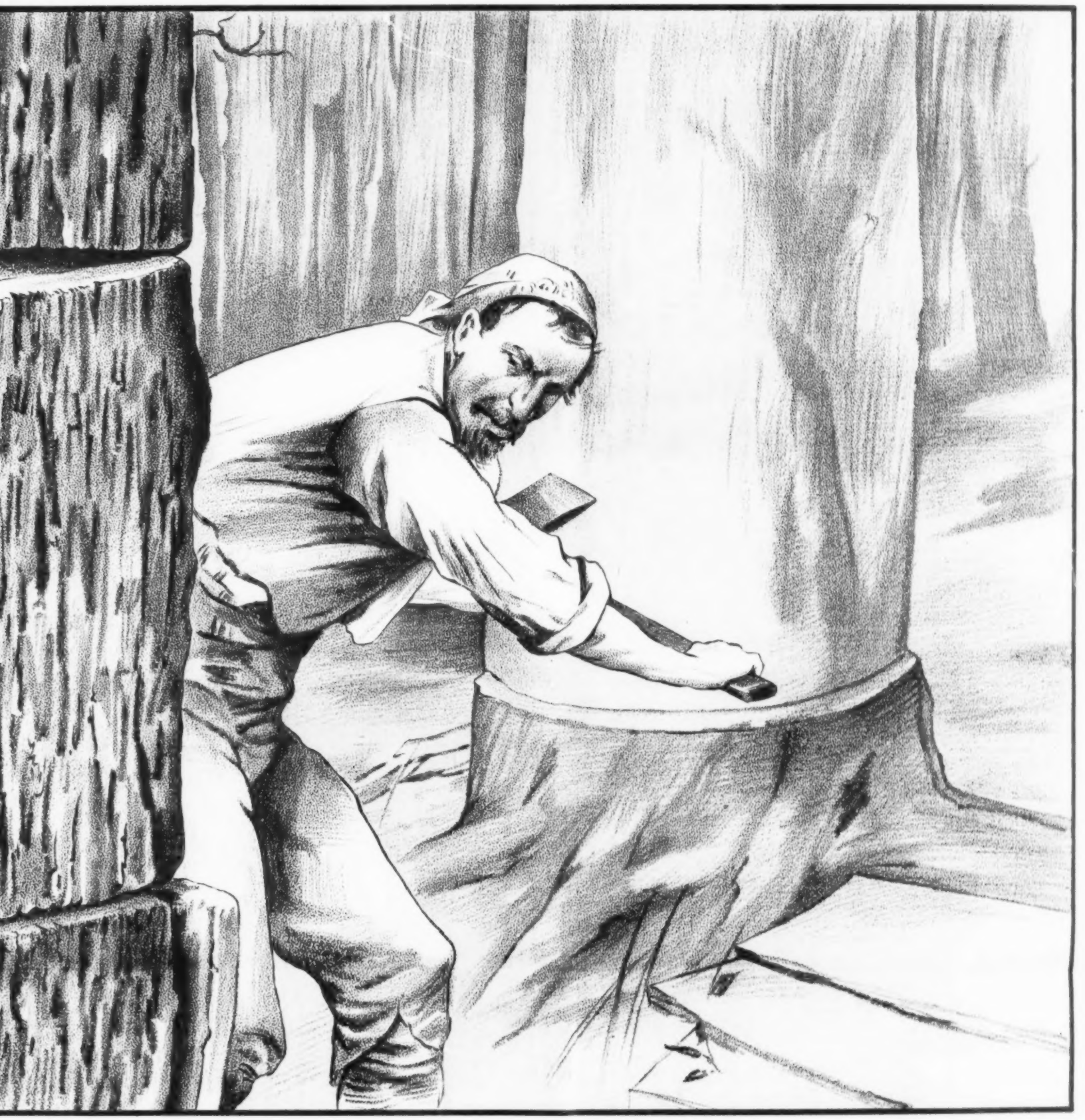

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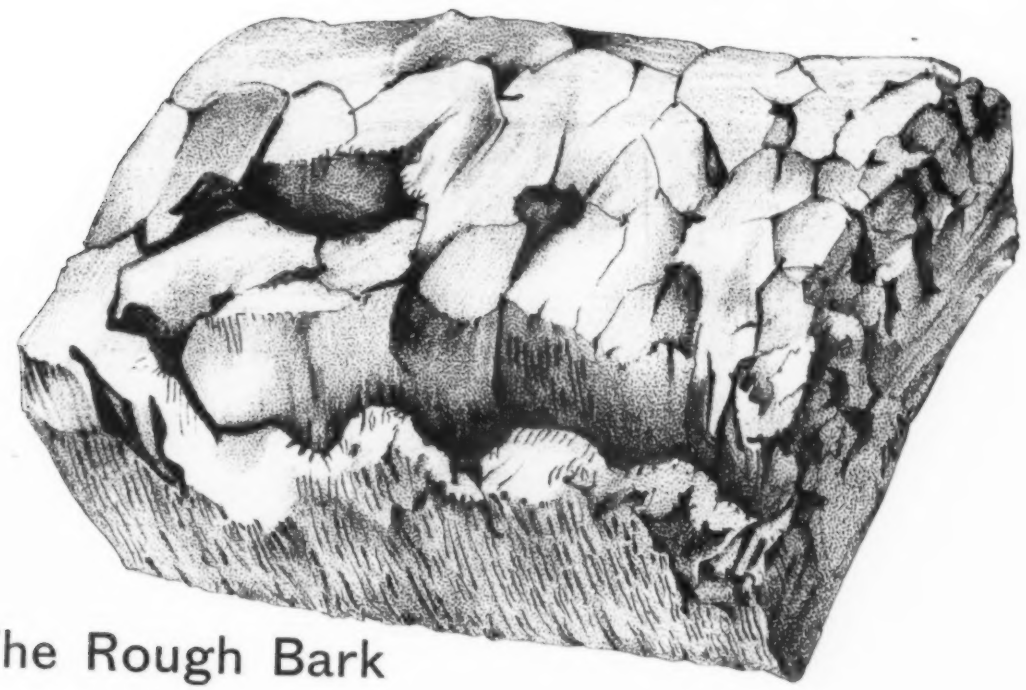

The Rough Bark

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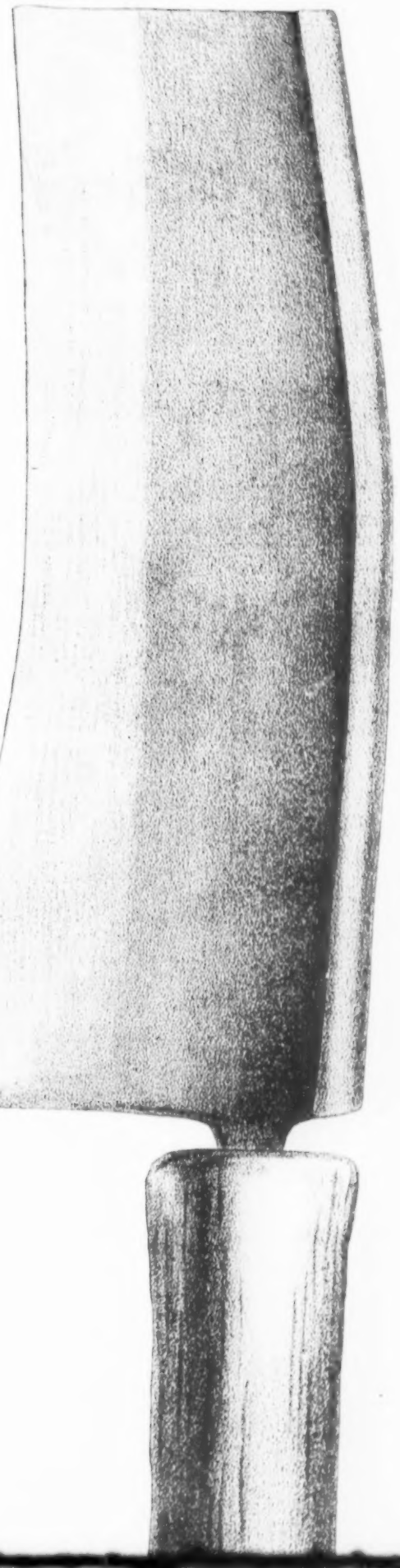

Lifeboat-man with Cork Jacket

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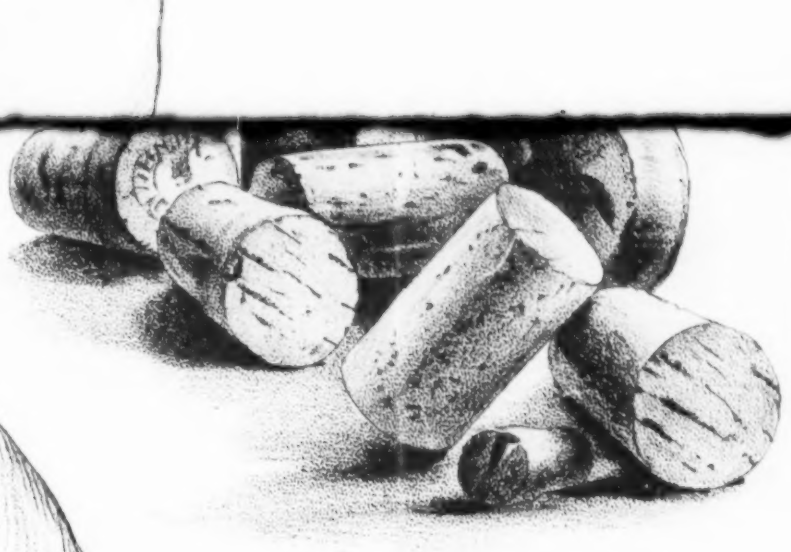

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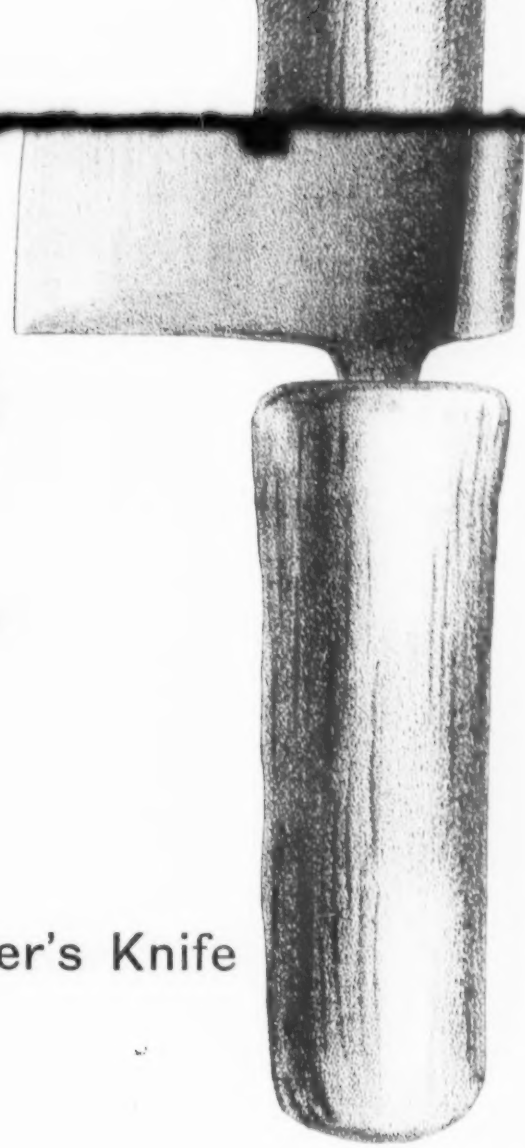

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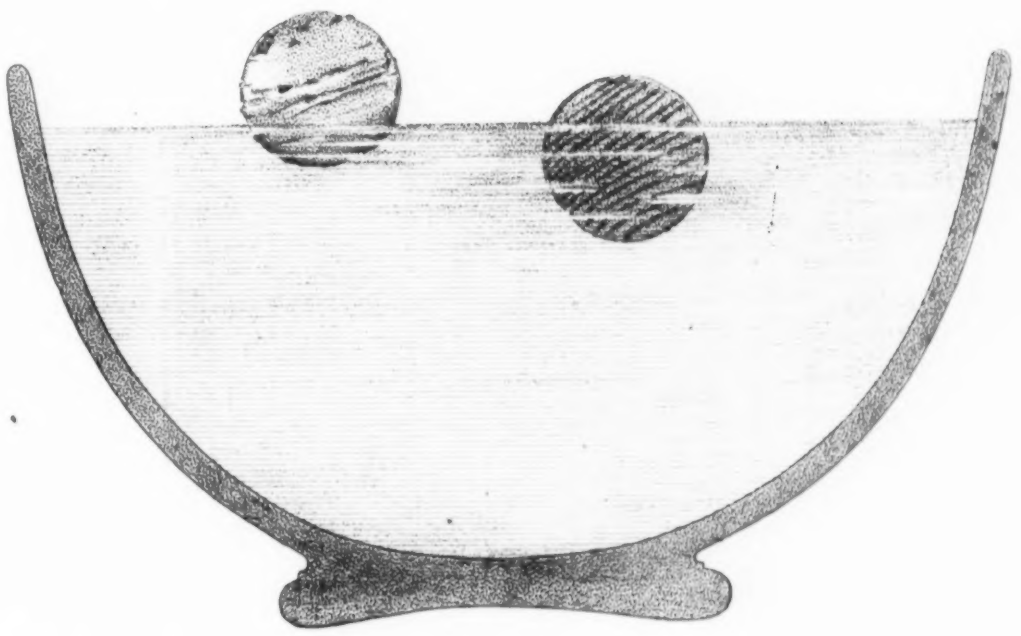

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Editorial, Publishing, and Advertising Offices: 33, PATERNOSTER ROW, LONDON, E.C.

NEW YORK OFFICE: 33, EAST 17th STREET and of all Booksellers and Newsagents at Home and Abroad.

COUPON
PRACTICAL TEACHER
JUNE 1898.

PRINTED BY EYRE AND SPOTTISWOODE, *Her Majesty's Printers*, DOWNS PARK ROAD, N.E., and PUBLISHED BY THE PROPRIETORS AT THE OFFICE OF 'THE PRACTICAL TEACHER,' 33, PATERNOSTER ROW, LONDON, E.C.

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